

# **The City Main Structure's Importance in Urban Life and Transformation**

*Thesis Submitted for the degree of*

**Doctor of Philosophy  
In  
Architecture and Urban Design**

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# Abstract

The concept of *city main structure* goes back to the ideas of E. Bacon (1974) and it is extended in this thesis to develop a concept for looking at city evolution. The hypothesis is based on the belief that the role of the central part of a city, its *city main structure* within the larger *city structure*, is the source of its holistic transformation and development.

The hypothesis understands that a city operates and transforms according to the *city main structure*, an intangible set of intrinsic phenomena that underlie urban life, overall form and identity.

The research uses the insights offered by the philosophy of *structuralism* to derive the underlying forces of urban transformation.

The study seeks to understand the significance of the city main structure in different dimensions of urban life. Understanding the interaction between underlying political, economic, socio-cultural forces as deep structural elements is an important aspect of the research objectives. This research also studies how physical or functional changes follow changes in the underlying forces.

The approach to the research objectives is based on two methodologies:

*A) Deductive:* a theoretical investigation based on the properties of the structure in the urban transformation process, as introduced by structuralism. This combines information from literature reviews and the ideas of key figures in urban development.

*B) Inductive:* a study of the two cities of Edinburgh and Isfahan as examples of historical settlements that have undergone many transformations. An open-ended questionnaire is applied to elicit people's images of the city main structures to support the theoretical propositions of surface and deep structural city elements. The conclusion to this part is based on a comparative analysis of the case studies.

The author finds that the *city main structure* prevents the city from stagnating and acts to transform the city to ever-higher levels of qualitative complexity. It confirms that the transformation is immaterial in nature but includes visible consequences. It is the mutual interaction of deep and surface structures.

The research indicates that the cities of Edinburgh and Isfahan have maintained their *city main structure* despite new demands and desires that impose massive changes to their surface structures. The main explanation for this is that the re-use of physical historical elements allows cities to adapt new pressures into the old fabric, thereby reinforcing their historical processes of structural transformation.

The research results are expected to open up a new way to envisage urban studies. The research aims to introduce a method for planners and decision-makers that opens up new avenues for thinking about urban transformation. It offers a way to reconstruct urban design theory around the search for underlying systems of order.



# Declaration

This thesis is my original work and has been composed solely by my self.

**Maliheh Hamidi**

# Acknowledgement

First and for most, praise to God in whom I totally believe and depend on. By His will the accomplishment of this study was made possible; and may his blessing and peace be upon His Prophet Mohammed.

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Without the help and support of all these kind people this thesis would not have been realised and I hope they can all take pleasure in the result.

## Introduction

### Part One: Theoretical Framework

#### Introduction

#### Chapter One: Introduction

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## Introduction

# Introduction

The purpose of this study was to investigate the effects of a 12-week intervention program on the physical fitness and health-related quality of life of sedentary adults. The study was conducted in a community-based setting and involved a total of 120 participants.

The study was designed as a randomized controlled trial. Participants were randomly assigned to either the intervention group or the control group. The intervention group received a 12-week program of supervised exercise, while the control group remained sedentary. The primary outcome was the change in physical fitness, measured by maximum oxygen consumption ( $\dot{V}O_{2\max}$ ), and the secondary outcome was the change in health-related quality of life, measured by the SF-36 questionnaire.

The study was approved by the ethics committee of the University of [Name]. The intervention program was supervised by a qualified exercise professional and followed the guidelines of the American College of Sports Medicine (ACSM). The study was registered at the ClinicalTrials.gov database (NCT01234567) and the results were published in the [Journal Name] in 2017.

A total of 120 participants were recruited from local community centers and social media. The participants were screened for any contraindications to exercise and provided written informed consent. The study was conducted in a community-based setting and involved a total of 120 participants.

## Hypotheses

The hypotheses of this study were that the 12-week intervention program would result in a significant increase in physical fitness and health-related quality of life compared to the control group.

# Introduction

## The research background

The concept of city main structure was formed in the author's mind during her post-graduate studies in urban design in the 1990s. The root of the concept goes back to the ideas of Edmond Bacon.

*Though the leaves go and come each fall and spring, the trunk and branches of the tree remain, and it is they that determine the form of the tree* (Bacon, 1974, p.306).

The idea took the author's attention. It suggested a process that united continuity with change and growth. Later she tried to develop from it a concept on looking to evolution of cities. The first outcomes were presented in a paper titled *city conservation methodologies*, suggesting that the preservation of the role and importance of the central part or *the city main structure*, within the *city structure* of historical towns is the most effective way for urban conservation and planning.

The idea later was supported by a branch of the Tehran Municipality called Tehran Engineering and Technology Consultant Organisation (TETCO) to be studied as a research project. The research started in 1993, and the project was titled *Recognising and Organising the City Main Structure*, with *Tehran* as the case study. The result of the research was published in three volumes in 1997 by TETCO.

A great desire to do further and more theoretical studies and applying the concept in some other cities encouraged the author towards more studies on the subject of the mechanism of underlying forces in urban transformation. The study has continued in the framework of this PhD research in the Edinburgh College of Art since 1996.

## Hypothesis

The hypothesis has organised this study. This supposition has provided the research map; although it became modified through the study, it served as a starting point for the



investigation. The initial research presuppositions, its basic and general understandings, have risen from the author's previous experiences. These understandings are fundamentally based on visible or physical aspects of the structure of cities.

The thesis hypothesis regards a city as a living organism, which has a *structure*. The structure forms and composes the whole physical entity of the city and relates different parts together. The city form and pattern depends on its structure. The main parts of this structure, which in this research is called *the city main structure*, could be compared to the spine for a living organism comprising major urban elements. This forms a network of the highest concentration of activities within the city and integrates the whole city. The branches of the main structure continue into different districts of city. Other parts of the city are like fillers for this fundamental frame.

There are definite characteristics that make the city main structure different from the fillers. Special land uses and activities take place within the area. The general specification of this area is the public and intensive use of it. The city main structure's importance in urban life is rooted in the historical values of the area. This area could be regarded as a visible history.

According to the hypothesis the process of formation of the city main structure is not spontaneous but is the manifestation of internal and/or external factors working in a complex and highly evolved mechanism. The core of the hypothesis is related to the evolution process and the role of the city main structure in the process. The presupposition is that transformation in the city structure is directly or indirectly related to its structure. The city main structure remains throughout the history of the city although it can itself undergo so many changes physically and/or functionally. This does not mean that the area necessarily grows, and prospers as much evidence from historical cities indicates that it might deteriorate as well.

## **Research objectives:**

The main purpose of this research is to shed light on the mechanism behind the urban transformation process, which is based on the city structural properties. It addresses this by studying the surface structure or manifestation of the city main structure and seeking



to understand how its many structural forces demonstrate themselves in urban elements, urban land-uses and human activities.

There is further intention to identify the physical and functional manifestation of the deep structural elements within the city structure and to understand the significance of the city main structure in different dimensions of urban life.

Understanding the interaction between the underlying political, economic, socio-cultural forces as deep structural elements in the process of urban transformation is an important aspect of the research objectives.

The final objective of this research is to find out the rules of transformation in cities regarding the structural properties and to clarify laws of composition and structural order of the city.

## **The research methodology:**

The methodology to the research objectives is based on two approaches:

*A) Deductive:* clarifying the main ideas of the properties of the structure by a review of related theories and then trying to find out how a city is a manifestation of these properties. The theory of structuralism offers many insights that are closely related to the hypothesis and objectives, so it is adopted as the meta-theory of the thesis. The research benefits from outlining the structural properties of structuralism to understand the properties of the city main structure in urban transformation. The research also derives much from a literature review and the ideas of some key figures to combine and synthesis ideas of structuralism with those of the city main structure.

*B) Inductive or empirical studies:* to support the theoretical discussions, an empirical approach is adopted in the form of two case studies. The selected cities of Edinburgh and Isfahan offer much to the field of this research. An open-ended questionnaire is applied to elicit people's values of various objects, spaces and activities within the city structure, and a cognitive image about the city structure. In this approach the concepts presented by ordinary city residents are observed side by side of what a professional study might conclude. The final conclusion is based on a comparative analysis of the two case studies from which general rules of structural transformation are derived.

## **Structure of the research:**

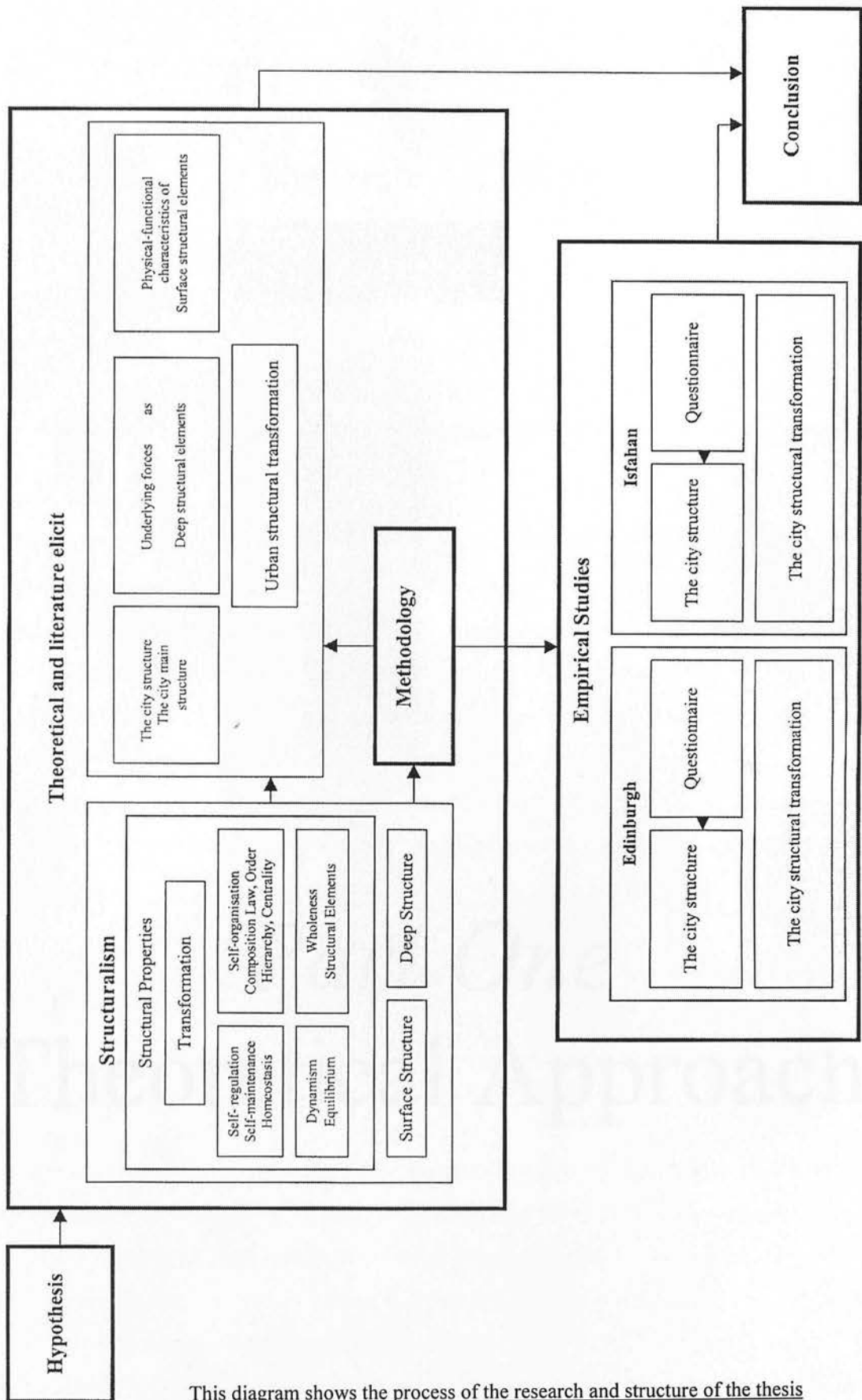
The research is compounded of four sections: Introduction, Part One or theoretical approach including five chapters, Part Two or empirical studies including three chapters, and the final Conclusion (see diagram page 5).

The first chapter is a brief review of structuralism and its paradigm of structural properties. Chapter Two is dedicated to introducing the concepts of city structure and city main structure. The third chapter explores underlying forces as deep structural elements. Chapter Four considers the surface structural characteristics physically and functionally and also intangible characteristics resulted from them. Chapter Five focuses on urban structural transformation.

Part Two including chapters six and seven addresses the visible surface structural elements of Edinburgh and Isfahan respectively. Each case study opens short historical review and tries to analyse these cities' transformation regarding underlying political, economic and cultural forces. The framework of these chapters is based on structural properties. Each of these chapters has benefited from people's ideas about their city's structural elements revealed in the reasons of importance for the mentioned places, as tools of interpreting the deep structural properties of the cities in the way people understand them. The results are analysed and represented on maps and tables. A comparative analysis and conclusion represents the central findings of the research.

## **Advantages of the reassert**

This research attempts a new approach to studying and experiencing the phenomenon of the city. It develops a new paradigm for looking at cities. The results of the study could be beneficial to decision-makers, planners and urban designers in dealing with the various pressures that are being levied on cities today and disallowing them their natural process of structural transformation and development based on inherent urban dynamism. The results of the research might help planners to see how supporting structural transformation can enhance their intentions and prevent the city structure from stagnation or deterioration.



# Part One

# Theoretical Approach

# PART ONE

## Theoretical Approach

### Introduction

*Though the leaves go and come each fall and spring, the trunk and branches of the tree remain, and it is they that determine the form of the tree* (Bacon, 1974, p.306).

The above quotation by Bacon (1974) makes a profound impression and promises to open up new avenues for thinking about the world and the mysterious phenomena that underlie urban phenomena. The analogy of the tree suggests a new way to envisage urban design in which the city has an inherent set of intentions which, like the overall form and identity of the tree, is not subject to change to extent of its components. Thus, just as the leaves of a tree are ephemeral and fall away each year, the individual people that constitute the society of a city, and the buildings that define its streets and pattern, can also disappear and change from one decade to the next, yet something deeper remains. The author calls this ‘something’ *the city main structure*.

A focus of the author’s thoughts are that, while conservation has a tendency to preserve the elements of a city, greater benefits with regard to the wider social desire to *conserve* the *quality* of cities could come from identifying and seeking to enhance the underlying forces of the city.

Originally the *city main structure* was viewed as directly analogous to the trunk of a tree or the spine of a human being. The physical nature of the structure was always in the author’s mind. The conceptualisation of *city main structure* has evolved and become more abstract and subjective. It has taken on the form of a coherent body of rules and purposes that lends characterisation and identity to the city. This remains as a guiding force throughout the development of the city, so long as the city is free to develop along its own innate paths, or can be greatly weakened and damaged if growth is imposed

upon a city by external pressures such as global technologies, economics, political ambitions and the loss of cultural norms within the resident society.

This insight deepened the perception of the city within the author's thoughts. She observed that some parts of cities obeyed hidden sets of rules, and brought these to the surface as patterns that express the city main structure. These parts of the city *seemed* to use the controlling phenomenon of the city in order to achieve ever-higher levels of qualitative complexity, not just at the level of buildings but also in the way that social conventions co-evolved within their changing environment. This thesis is an investigation into such claims.

This Part, sets out a Theoretical Background, bases to building a concept. It attempts to organise the theoretical principles that contribute to the relevant areas of the urban knowledge. This is achieved by quick review of different school of thoughts relevant to urban studies field: Structuralism, Functionalism, Holism, Deconstruction, Modernism, Postmodernism Behaviourism, Culturalism, Positivism, Historism, Regionalism and Rationalism. From all these Structuralism is brought into focus.

The several approaches mentioned above towards looking into the city offer various ways to develop an understanding of its phenomena. Functionalism focuses on the essential link between the city and its daily and occasional uses. It believes a city must be studied ultimately in terms of its functions, but in addition to functioning, a process of structuring is also needed, a process of coupling the functional units (Tange, 1966). Although for structuralism the concept of function and structure are closely connected (Mukarovsky, 1978), functionalism belongs to an atomistic way of thought that regards parts first and the whole afterwards (Luchinger, 1981). Behaviourism establishes theoretical links and primary relations between behaviour and space, focusing on perceptible relationships between spatial form and human activities (Lynch, 1982). Modernism was developed around the intention to break with the past, rather than enhance its continuity, and tends to spatial mono-functionality. It is more a cosmetic city-beautiful approach and destroys in order to create (Bunning, 1996). It has been called a blueprint for placelessness (Ellin, 1996). While Postmodernism respects the indigenous nature of the city (Trancik, 1986), its function is to correlate the emergence of new formal features with the emergence of a new type of social life and a new economic order (Deer, 1986). Historicism is built upon a conception of time as linear



process and aims to reunite many aspects of buildings to the larger contemporary society (Trancik, 1986). Positivism's intention is highly associated with terms such as objectivity and quantification (Barati, 1997). It is a belief of the primacy of measurability and draws a hard line between objective and subjective issues (Blundell, 1985). Deconstructionism, on the other hand, views whole cultures, buildings, and cities as a series of interesting texts drawn from past experience. It holds that signs are arbitrarily constructed instead of assuming a presumed unity between signifier and signified (Ellin, 1996).

The closest of these schools of thought to the hypothesis were holism, metabolism and structuralism. The basic insight of holistic thought is that every phenomenon is a closed whole. Metabolism's interest lies in the use of organic metaphors for intrinsic nature of the city (Thompson, 1998). Changeability and flexibility are the key elements in this regard (Ross, 1978).

Although these two approaches are all valuable in increasing awareness of the mechanisms, rules and consequences of the city, they do not have at their heart an explanation of how transformation could both lead to enhanced states of complexity within a city and yet retain its characteristics, nor how the components of a city could change or vanish over time while the identity of city itself remains. The author's point of view that visible phenomena are governed by invisible ones and her approach, which is to trace the invisible laws by observing the surface patterns they have generated, requires a theory that would clarify a more comprehensive, philosophical set of properties to look for while interpreting a city. Even *general systems theory*, while offering an all-encompassing explanation for the physical nature of a city, does not embrace the nature of transformation and how the city exists in a temporal as well as a physical setting.

Part One introduces five major themes and also the conclusion. These cover themes of: *structuralism*, which review structural properties, *the city structure* and *the city main structure* regarding their structural properties; *underlying forces* which are interpreted as deep structural elements; *visible characteristics* of the city main structure; and *structural transformation*. The objective of Part One is a literature review that builds up a concept of the city main structure properties particularly in the process of urban transformation based on the structuralism paradigm on structural properties. Different



chapters of this part draw the ideas from some key figure and their ideas to structuralism.

In this discussion of aspects of the rules of structural transformation within the cities, the thesis puts its fundamental concern is underlying forces as deep structural elements and the mechanism through which they interact. The visible manifestation of deep structural elements in the form of surface structural elements is also considered.

The first chapter reviews structuralism and focuses on some of the most mentioned structural properties in literatures. The following chapters are constructed on the findings and concepts introduced in this chapter. The intention of the theoretical approach is to crystallise the ideas and synthesise them into a research, to help understand how, the main city structure operates in urban life and on process of transformation.

*Any analysis of the concept of structure should take into account all the functions performed by this concept. In this case the word structure is used in the context of an operative definition. It is the concept of structure itself that constitutes the starting point of the discussion, available data or literature about the subject* (Boundon, 1971, pp. 16-17).

## Methodology

Bearing in mind the presupposition of the hypothesis, the methodology was chosen to support, develop and refine the ideas.

The theoretical approach is undertaken from three angles. First, for an awareness of the meanings and concepts of city structure, city centre and city evolution, comparative studies on the ideas of some key figures related the all-embracing theory of structuralism, are presented. These cover descriptive, explanatory and analytical discussions. Part One is focussed on the specific properties associated with the city main structure, and different aspects of its importance, reviewed in it. Those key properties then are criteria to test realities behind urban transformation.



# Chapter One

## Structuralism

### 1-0 Introduction to structuralism

Amongst the theoretical approach, structuralism offers not a doctrine but a method to clarify and seek laws that guide surface patterns. It offers a way to bridge between the physical realm and its underlying laws, using transformation itself as the phenomenon that connects them. It offers a way to reconstruct urban design theory around the search for underlying systems of order. To the author it proposes a way to open her eyes and mind to otherwise hidden phenomena, and that is not only directed towards investigating any specific aspect of a city (such as its economy, society, energy usage or architecture) but could be made use of in any of these explorations.

The notion of whole is by no means the only basic concept with which structuralism works. The fundamental notion for structuralists thought is that of the interplay of the forces, agreeing with or opposing one another and relating a general equilibrium by a constantly repeated synthesis (Mukarovsky, 1978).

The thesis adopts structuralism to derive the theoretical discussions and the criteria against which the hypothesis is tested. The core idea of structuralism that of the structure and its main properties is reviewed to provide an understanding of genotype based on specific notions and important points. These notions help to make a link between abstract meanings and meanings related to the city context.

### 1-1 Background of the theory

Structuralism has a long history, within the history of sciences. It emerged as a general philosophy presented in 1929 in the social sciences (psychology, linguistics, and ethnology). The range of disciplines in which structuralism has come to be applied is very wide: from physics, chemistry and biology through psychology, economics and

sociology up to linguistics. Structuralism as a movement reached its peak in the mid-1960s, associated with the work of the structural anthropologist, Levi-Strauss who, in 1969 extended the analogy of structure to society. Although structuralism has grown from the specialist fields of linguistics and anthropology, its wider applications came from attempts to uncover the internal relationships of the elements of any given system. Structuralism has also become subject to various interpretations and debates in very general terms.

The Otterlo meeting (1952) can be regarded as the beginning of structuralism in architecture and urban planning. According to Arnulf Luchinger (1981) it is seen as the most important avant-garde movement from 1960 to 1980, a reaction to the functionalism of CIAM (1920-1960) and that offered a comprehensive ideology that has influenced on urban planning. Structuralism entry to urban theory had the more pragmatic catalysts of civil disorder and public unease (Herbert *et al.*, 1990).

The concept of structure, as used increasingly in the non-natural sciences, is now part of a fundamental concern in science. The roots of structuralism could be traced in thermodynamics, which is the study of irreversible physical process. The idea of history as a continuous process, and the theory of evolution which opened up the dimension of time in biological science, all participated in the concern for the irreversible process.

Structuralism is primarily considered as a method rather than a doctrine by Piaget (1968) that its doctrinal consequences have been quiet various. Balzer *et al.* (1996) claim that structuralists use concepts and methods mainly for two kinds of purposes: first, to clarify some general epistemological, methodological and meta-theoretical questions about sciences; second, to reconstruct particular scientific theories.

In a general sense, structuralism attempts, in many disciplines, to discover systems of order existing within reality. Its fundamental aim is the discovery of general laws, by either inductive or deductive processes. A considerable portion of structuralist literature therefore deals with case studies.

The pragmatic aim of structuralism has always been to solve problems by objectivising the concept of structure at the level of society itself. Hillier and Leaman (1972-3) believe that the whole purpose of structuralism is to offer an explanation of difference

and variety, through theories of sameness. In structuralist methodology, the foundation is laid in the semiological synthesis of mathematics, logic and language. Structuralism thus proposes a deep formation of the basis of richness and variety but its application returns it to the surface level, searching for a superficial sameness.

The significance of structuralism is to overlook into knowledge as an entity. The concept of structure is used in the non-natural science for questions of form, order, system and transformation. Structuralism proposes in essence the reconstruction of what is already known.

Structuralism consists of different thoughts and concepts. Distinguishing these concepts, Piaget (1968) claims that there are two important differences between *global* structuralism and the *deliberative, analytical* structuralism of, Levi-Strauss, where the former speaks of *emergence*, the latter speaks of *laws of composition*. Durkheim's structuralism, for example, is merely global, because he treats totality as a primary concept explanatory, as such; the social whole arises of itself from the union of components; it *emerges*.

The core idea of structuralism is structure and its properties. These general properties might find their particular meaning regarding the disciplines, which are applied. Two major points of this theory should be considered as the *content* and the *relations*.

In the eighteenth century, the word '*structure*' was used to define physical phenomena in terms of observable assemblages, the composition and arrangement of the pieces that makes up a body. The inner architecture of form was not given in its surface appearance, and its explanation required concepts of function.

In Anglo-Saxon countries the concept of structure tended to be reserved for observable relations and interactions. Parsons' definition of structure is as a stable disposition of the elements of a social system. For Parsons, structure and function together belong to a *total system* that is conserved by *regulations*. He tried to explain how individuals come to integrate communal (collective) values. The work of M.J. Levy reduced structures to observable uniformity and functions to diachronic manifestations of structure (Piaget; 1968).

Structuralism seeks to discover the objective residue of meaning that remains when abstraction has been made from all subjective interpretations. Structuralism therefore directs our attention away from the illusions of consciousness to the unconscious substratum of meaning. It is the unconscious that mediates between us and the world, creating the twin illusions of reality and subjectivity.

For Luchinger (1981) the term '*structure*' is normally a synchronous notion: it describes a set of relations that hold at a particular point in time. Structure always means some unified system of rules possessing an internal logic of their own. He criticises structuralism because it pays attention to how structures organise society, but not to how society organises structures. Structuralism seems to avoid both the question of the *origin* of structure, and the question of its *locus*. In structuralism, the idea of a rule is basic. A structure is a co-ordination of rules and there is no arrangement without structure.

Biological structuralism understood the gene systems. They believe that the individual genes are no longer performing as soloists, but as members of an orchestra (Piaget, 1968). The organic structures are viewed either as the products of an evolving process of construction or as predestined from the beginning and for all time by the original DNA molecule.

For structuralists, structure is a system that alters with the lapse of time. It is subject to a continuous programme of input, process and output, leading to its progressive replacement. It nevertheless retains its internal coherence, unity and identity. It stays the same when everything appears to change. It is invariant under the transformation of a particular set of phenomena.

Structure is an abstract set of formal relations underlying the greater manifest richness of observable forms. It is a field that is not an aggregation of elements, but an expression describing a set of relations between things governed by some overriding formative law. Boundon believes (1971) that structure could be defined as *system of relationships*. He states that these relationships are *stable*. He believes that the set of relationships, characterise the structure. The system of relations is thus perceived as the basis of the structure.



For Kepes (1965) structure is a formal system of relations of certain logical types, and the emphasis is on the relations rather than on the terms or entities which they relate.

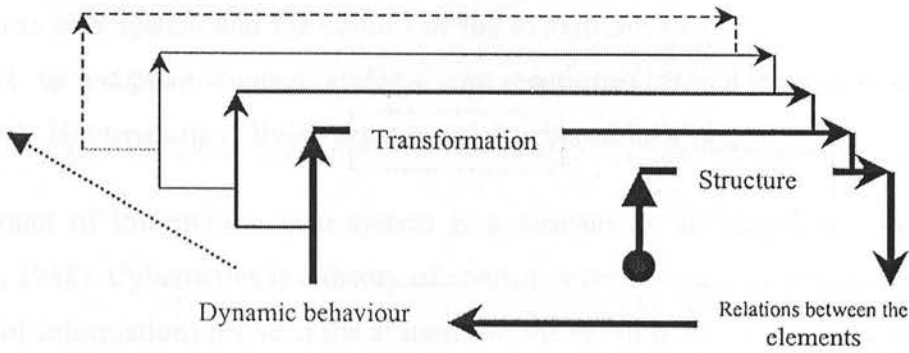
Boundon (1971) indicates that structural analysis is, in a way, a theory of appearance, since the structural description allows for a reconstruction of the phenomenal characteristics of the given system. Structural analysis finally demonstrates the coherence of facts. In addition, structural analysis implies that all the elements of structure are taken into account. By definition, a structural analysis covers the whole set of apparent characteristics of a system. He adds a process can be called *structurally stable*, since the structural parameters are constant at all the times considered. The concept of structure can thus be extended to the analysis of process. He argues that to believe with some that structuralism may reveal the hidden aspect of things or even to wonder whether structures describe the essence or the deep meaning of things, prevents one from understanding the concept of structure. The structural description of an object does contrast with its phenomenal description, as essence does with appearance. Structural analysis does show as coherent facts that can appear as incoherent to the observer. Lastly, structural description always emphasises that the parts of an object are dependent upon the whole, which is the object.

## 1-2 Structure and System

Central to *structuralist* theory is the concept of *system*, a term which describes the essential relatedness of all things, denying the isolation and fragmentation of reality in the supposed interest of deductive method. The first principle of any system of organisation hinges around the question of relation. On the other hand the crucial elements of structure are not the things themselves but the relationships between things. Systems must be seen as '*holistic*', in the structuralist sense.

Structuralists applied the notion of time, and consequently transformation, to the original concept of system. The ideas of structure and dynamic behaviour apply to all systems that change through time. Such dynamic systems like biology, social systems, psychology and ecology, are those in which positive and negative-feedback processes manifest themselves in growth and regulatory action (Forrester, 1969).





Another approach to the relation between system and structure is that all systems have an internal structure and so systemness of an artificial system depends on its structure. To begin to understand a thing or a system, we have to find out about its structure, either what has produced this structure or what its function is.

Structure seems not to be a thing in its own right. Originally a structure was a structure of something. A system, then, is a kind of entity - an abstract entity - and a structure is one of its properties. Some scientists' aims, in their work, have been to uncover the structure of a system.

Two kinds of system described by Waddington (1977) are those of closed system and open system. In a closed system nothing passes either inwards or outwards. In an open system things pass into the system from the outside are processed and something else extruded outwards again. Every living organism is essentially an open system (Burton, 1939). The open system maintains itself in a continuous inflow and outflow (Bertalanffy, 1968). The basis of the open-system model is the dynamic interaction of its components. Even within one particular system there may be subsystems or associated systems of different types like, natural systems, systems of human activities or social systems.

Boulding (1956) tries to shade light onto the ways of constructing a system of systems. In this regard he suggests that three dimensions: man, energy and information, exist in the model of population change and the dynamic interactions of its members. Then he proposes an arrangement in a hierarchy of organisation of several levels from static structures to the human level to social organisation and the transcendental system.

Carter *et al.* (1984) suggest that a system needs control to hold together. Structure and the process of a system and the control of the system are two sides of the same coin. *Feedback* or *adaptive control* systems are mentioned as the way the system is controlled. Homeostasis in living organisms is such a control system.

The amount of information in a system is a measure of its degree of organisation (Wiener, 1948). Cybernetics is a theory of control system based on communication (the transfer of information) between the system and the environment and within the system and control (feedback) of the system's function in regard to environment (Islami, 1998).

*System change* is discussed by Ackoff *et al.* (1972) as a system of reaction or response, which is a series of events that occurs to the same system or its environment. He classifies *system behaviour*, which is a system's tendency to state-maintaining, goal-seeking and purposeful behaviours. State-maintaining system behaviour is necessarily adaptive to internal and external changes. Goal-seeking behaviour is not reactive but responsive behaviour and it is an example of a process. A purposeful system can choose, the means by which to pursue its goal (Islami, 1998). The *goal* of a purposeful system is defined by Ackoff *et al.* (1972) as a preferred outcome in a particular situation that can be obtained within a specified time period. Human beings are the most familiar examples of such systems.

An open system may actively tend towards a state of higher organisation. A higher organisation can be reached by use of the feedback mechanism. *Learning* and *adapting* are two key principles in the processes of development in such system like a human society (Islami, 1998).

In system view, it is necessary to study not only parts and processes in isolation, but also to solve the decisive problems found in the organisations and the order unifying them. The dynamic interaction of parts makes the behaviour of parts different whether in isolation from or within the whole (Bertalanffy, 1968).

The above-mentioned arguments on system reflect on the structuralists' ideas of structure and consequently its properties.

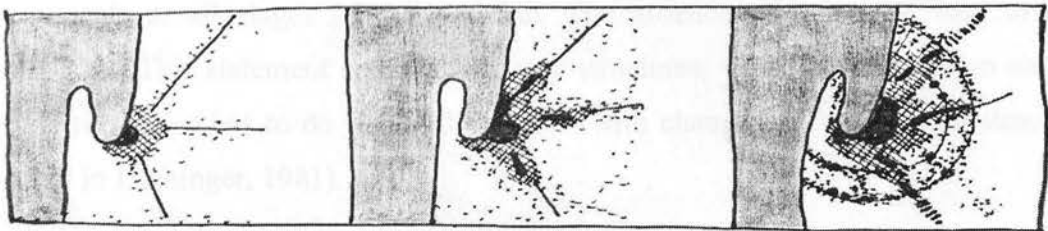
## 1-3 Structural properties (properties of structure)

Structures in general have, despite their diversity, certain common and perhaps necessary properties (Piaget, 1968). According to this idea, structure is comprised of three key ideas: the idea of wholeness, the idea at transformation, and the idea of self-regulation. A review on these fundamental properties of structure leads to find out some more implicit properties of structure. The core of the author's interest in the city structure is that it is a phenomenon that transforms the city as an entity and this is the most significant contribution that structuralism has over general system theory.

### 1-3-1 Transformation

Structure is a system of transformation, which involves laws. Structure is preserved or enriched by the interplay of its laws of transformation, which never yield results external to the system nor employ elements that are external to it (Piaget, 1968). Transformation is inherited in a structure and never leads beyond the system but always engenders elements that belong to it and preserve its laws. The elements of a structure must be differentiated from the transformation laws, which apply to them (Piaget, 1968).

Piaget also claims (*ibid.*) that transformation is always passing from a simpler to a more complex structure. The idea of transformation makes the question of origin that is of the relation between formation and transformation.



Piaget in his studies of the development of cognition (1971) uses both the group notion and his insight that transformation transforms the structure at one stage into the structure of the next stage. He also emphasises the transformation effect of these structures in the real world of the problems or objects.

From the beginning, linguistic and psychological structuralism was associated with the drawing of ideas of transformation. Chomsky (1971) discusses *transformational grammar*. Piaget (1968) indicates that all known structures are, without exception, systems of transformation.

The key concept of transformation, which is at the heart of the structuralist paradigm, is also at the heart of the theory of evolution.

The roots of transformation as a structural property in structuralism could be traced to the theory of evolution that opened up the dimension of time in the biological sciences. The theory of evolution, new historical theories of society and thermodynamics all participated in this pervasive concern for the irreversible process of transformation. Darwinian evolution shed light on the source both of stability and changes in the historical development of the system in question.

In structuralism the dimension of time was recovered through the central notion of transformation. It extended the term of *structure*, as used by a biologist from being an organism just as closed and integrated as a configuration. It allowed for a structuralist viewpoint of which *structure* means a stream of forces passing through time, constantly regrouping (Hillier *et al.* 1972-3).

Transformation implies structure. The bond between structure and transformation links the evolutionary relation of both to their surface appearance. William Badgraven (1952) expressed the necessity of evolving structures and forms in built environment which can develop in time; which can remain a unity and maintain the coherence of the components at all stages of their growth. The absence of this must lead to self-destruction. This statement concerns primary structures, whilst the expression *time as formative factors* has to do first and foremost with changes within primary structures (quoted in Luchinger, 1981).

An important notion in Piaget's ideas regarding transformation refers to an intelligible change, which does not transform things beyond recognition at one stroke. This is a certain inseparable connection at identity and change, which combines transformation and conservation.

Hillier *et al.* (1972-3) believe that the transformation of structure depends on *information* or *programmes*.

Structuralists believe that structure and genesis are interdependent. Genesis is transition from one structure to another. The transition always leads from a *weaker* to a *stronger* structure. It is a formative transition.

Chomsky (1971), in his attempts to formalise linguistic transformation notes that the transformation rules have a certain regulative power as well: they *filter out* certain structures as *ill formed*. His theories place structures among those general structures, which derive their wholeness not from descriptive and static laws, but from laws of transformation: and whose orderliness is a matter of self-regulation. Chomsky's interest in the transformation laws of *generative grammar* oriented in the idea that grammar has its roots in reason, and in an *innate* reason. He uses the concept of transformation to account for the transition from meaning to verbal production, from deep to surface structure.

### 1-3-2 Dynamism

Dynamic interrelation among the components of a structure is considered as specific property of it. The notion of structure in structuralism contains an inherently dynamic aspect. In structuralist discussions like structural anthropology by De Saussure (1966), dynamism focuses on the way elements of a system combine together, rather than on their intrinsic value. *Differences* and *relations* are the key notions here, which will give rise to oppositions and contradictions.

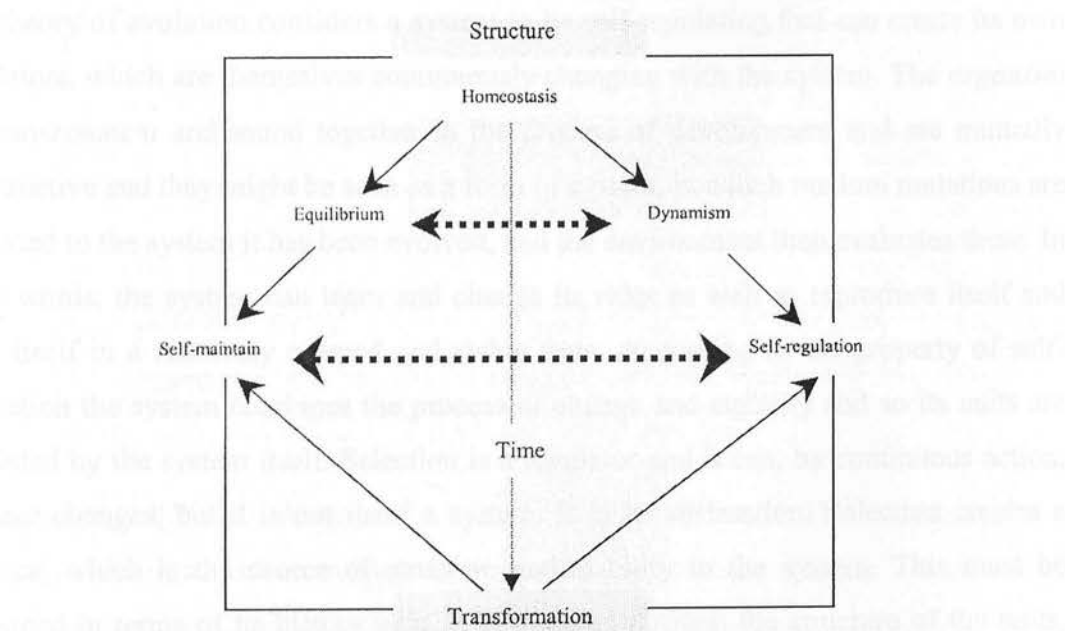
According to Forrester (1969), the concepts of structure and dynamic behaviour apply to all systems that change through time.

A whole being dynamic, is the seat of transformation, emergence and composition. Structure is considered by structuralism only such a set of elements that the internal equilibrium of which is constantly disturbed and restored. A structure's unity, thus, appears to be as a set of dialectic contradictions. The identity of a structure endures in the course of time, whereas its internal composition, the co-relation of its components, changes continually.

1-3-3 Self-regulation

One of the basic properties of structure, which makes the idea of structure so important as a tool for the analysis of phenomena, is its self-regulation. Piaget (1968) stresses that self-regulation may be achieved by various procedures or processes, and these can be ranked in order of increasing complexity. Rhythm, regulation and operation are the three basic mechanisms of self-regulation and self-maintenance which are real stages of a structure's construction.

Self-regulation covers the laws of formation and those of transformation bound together. They delimit the system and account for its existence. The balance between the *structure of* and *structuring* aspects of any system represents the *equilibrium*, which that system possesses in terms of its innate ability to control its own internal processes. This property is often referred to as *self-maintenance*, *feedback*, *homeostasis* or *equilibrium*. The processes that achieve self-regulation within structures can be seen to correspond to principles of hierarchy and are analysable in these terms. The concept of equilibrium can be seen to exist in two main aspects. Firstly as a *static* or *true equilibrium*, and secondly as a *steady state* or *dynamic homeostasis*, where the character of the system is preserved but its structure may shift to a qualitatively higher level of order in terms of complexity. A *state* of equilibrium must always be distinguished from the *process* of equilibrium.





Homeostasis, which first introduced into biology by Cannon (1932), refers to the regulation of internal conditions to preserve a permanent state of equilibrium. The term *homeostasis*, plays a central role in system theory.

The structuralist tendency for discovery of structural regulations and regeneration is accentuated by the work of Waddington (1957), in which *homeostasis* means that development involves a kinetic equilibration. Waddington shows that the environment and the gene complex interact in the formation of the phenotype, that the phenotype is the response to the environment *incitations*, and that *selection* operates not on the gene complex but on these responses. By this idea, he was able to develop a theory of *genetic assimilation*. Waddington views the relations between the organism and its environment as a cybernetic loop such that the organism selects its environment while being conditioned by it. What this means that the notion of structure as a self-regulating system should be carried beyond the individual organism, beyond even the population, to encompass the phenotype and genetic code (Piaget, 1968).

Although the movement of complex structures is towards a true equilibrium, this is seldom attained since this activity contradicts the essential purpose of most structural types whose central function is to perform work. Piaget says that self-regulation proceeds by the application of perfectly explicit rules, these rules being responsible for the existence of the structure in the first place.

The theory of evolution considers a system to be self-regulating that can create its own regulators, which are themselves continuously changing with the system. The *organism* and *environment* are bound together in the process of development and are mutually constructive and they might be seen as a form of system, in which random mutations are proposed to the system it has been evolved, and the environment then evaluates these. In other words, the system can learn and change its rules as well as reproduce itself and keep itself in a relatively ordered and stable state. According to the property of self-regulation the system combines the process of change and stability and so its units are regulated by the system itself. Selection is a regulator and it can, by continuous action, sponsor changes, but it is not itself a system. It is an abstraction. Selection creates a *balance*, which is the source of structure and stability in the system. This must be explained in terms of its history as it is transmitted through the structure of the units,

and regulated by the evolving systemic regulators, transmission of stability and the generation of variety and internal developments. The evolutionary paradigm requires man to see himself as a designer (Hillier *et al.* 1972-3).

Piaget's interpretation of self-regulation (1968) is a kind of conservation along with stability of boundaries. But self-regulation also means construction of many new elements. This conception makes the idea of structure so important. Self-regulation may be achieved by various procedures or processes, and increase the complexity of the system.

Piaget (1968) concludes that only self-regulating transformational system is structure. A structure must be governed from within. By this self-regulation implied as a sort of functional activity.

Structuralists prefer to define *norm* as a regulating energetic principle. A structure from the viewpoint of social science is called a set of norms. In this case, norms must not be understood as static rules but live forces.

### 1-3-4 Wholeness

A structure is usually defined as a *whole* and by its associated definitions: *structure-totality*, *structure-system of relationships*, and *structure-whole irreducible to the sum of its parts*. For structuralists there is a fundamental contrast between *structure* and *aggregation*. Many structuralists would describe a structure as a complete set of relationships, in which the elements can change, but in such a way that these remain dependent on the whole and retain their meaning. A whole is not reducible to the sum of its parts. The whole is independent of its relationships to the elements, the relationships between elements are interchangeable, but not the relationships. All the elements of a structure are influenced by the whole to which they belong. The whole according to Assiter (1984) forms a system whose elements are interconnected and where the structure of the whole determines the position of each element.

Wholeness in structuralism approach indicates that *whole* is not just a composition of the independent units. It actually is the result of the laws of systematic composition, which governs the transformation of the system. Therefore, all structures are

transformational systems. A structure is not an aggregation of elements, but an expression describing set relationships between things governed by some overriding formative laws (Harvard, 1987).

Wholes could be defined in terms of their structural laws; their whole's laws of composition. According to the structuralist viewpoint the whole is prior to its elements and it is not a simple juxtaposition of elements. Piaget explains (1968) that the logical procedures or natural processes by which the whole is formed are primary, not the whole itself which is the consequence of the structure's law of composition. This concept is based on a relational perspective. According to Chomsky (1971), general structures derive their wholeness not from descriptive and static laws, but from laws of transformation.

Structuralism, on the other hand, attempts to grasp reality as a whole, in which part and whole are seen simultaneously. Man relinquishes his autonomous position, as creator and giver of significance, to the totality of things, to the structure. It is the whole that gives the part its defining characteristics in that physical situation. If the whole did not exist then the units would not be significant in the same way.

Piaget (1968) states that a structure (in the most general sense) exists when elements are united in a whole which presents certain properties as a whole and the properties of the elements are wholly or partially dependant on those of the whole. In this regard, Piaget stresses the bipolar nature of structured wholes as being simultaneously *structuring* and *structured*.

In structuralism the idea of wholeness been developed to show that the wholeness is the transformation of knowledge in a given structure through time consequently, it is possible to say that the concept of structure is conditioned by this transformational process (Harvard, 1987).

The property of wholeness in structuralism refers to the concept that structure is not an aggregation of elements, but an expression describing a set of relations between things governed by some overriding formative law. The concept of wholeness is derived from the concept of *field* in a thermodynamic analogy. Any *unit* that is part of a *field* is significant for physical process chiefly as so far as it is constitutive of, and constituted

by, a higher order while it is the whole that gives the part its defining characteristics in that physical situation.

### 1-3-5 Structural elements

A structure is an entity formed by constituent elements. A review on the definitions of structure reveals that almost all the ideas about structure refers to its elements directly or implicitly. Structure has been considered as a set of elements (Mukarovsky, 1978). Some argue for the interdependence of the elements (Boundon, 1971), but most give credence to elements, which are interconnected (Assiter, 1984). Boundon (1971) discusses structure as distinguishing elements, which are most basic to a system. He also writes that structural analysis implies that all the elements of structure are taken into account. Hillier *et al.* (1972-3) debate on structure states that *it is a set of elements together with a rule of combination or operation, subject to certain rules*. Levi- Strauss's definition of the term *structure* (1969) is that it is made up of several elements. He believes that structures have elements, but the elements of a structure are subordinated to one-by-one association of its element. Tange (1966) describes a structural approach as seeing the elements in their relation to each other in time and space.

The crucial elements of structure are not the physical components but the relationships between these components are for which the components are responsible. This emphasises on relationships implies that a structure and its elements are interwoven. Any modification in one element or in one relationship entails a modification in other elements or relationships.

Elements of structure confer on the whole as such overall properties, distinct from the properties of its elements (Piaget, 1968). According to him these elements do not exist in isolation from one another nor are discovered one by one in some accidental sequence and then finally united into a whole. They do not come upon the senses except as ordered, and this order is associated with structural properties. Piaget believes that, although structures do contain elements, these elements are subordinated to the laws that define the whole system. So structural elements are essentially, certain order relations, sub-ordination schemes and correspondences. Where Piaget discusses the

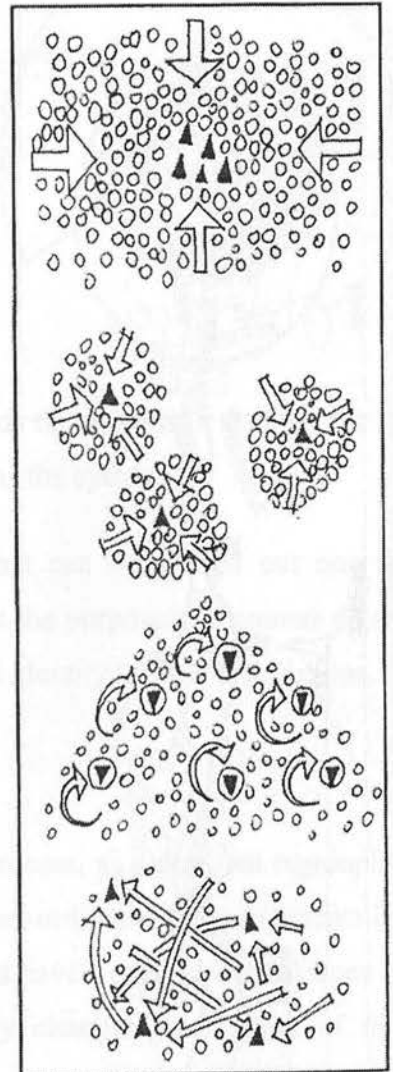
characteristics of structures writes the transformation inherent in a structure never leads beyond the system but always engenders elements that belong to it.

### 1-3-6 Laws of composition

Structures need to be regulated. The relationship between the elements of structured whole or a system follows specific laws. The *deliberative analytical* structuralism of Levi-Strauss speaks of *laws of composition*. Laws of composition represent the character of structured wholes; they also govern the transformations of the systems, which they structure and through which they are defined implicitly (Piaget, 1968). The structural elements are co-ordinated by the laws, which define the whole system and cannot exist independently as they might within an aggregation. In this regard, Hillier explains (1984) that in structuralism, the idea of a law is basic. It is the foundation of the concept of structure. A structure is a co-ordination of its laws by which it becomes unified and possesses an internal logic of its own. The character of structured wholes is represented by laws of composition (Piaget, 1968).

Structuralists are interested in *morphological* and *structural* laws. The laws deal not in changes but with co-existence (Assiter, 1984). Giddens (1984) also believes that rule-resource sets exist within structures. So not only the existence and function of a structure depends on the laws but also the regular changes and transformations are made by following consistently applied underlying laws.

In the case of composition, Mukarovsky (1978), indicates a very useful conclusion on the difference between a pattern and a structure that



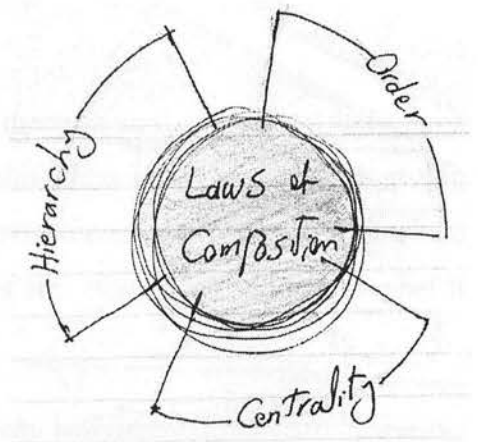


proportionality, symmetry, concentratedness and similar compositional features are not structural characteristics.

### 1-3-7 Order

A structure is concerned with the ordered relation of parts to a whole, with the arrangement in which the elements are linked together. Based on this order, elements of a structure could be perceived by combining into structures of a higher order.

Structuralism returns to the beginning, to explore the unknown dimension that ordered and structured everything. Levi-Strauss pointed out that structuralist attempts to discover the order behind various phenomena do not seek to equate phenomena with an order constructed in advance, but rather that reproduction, reconstruction and reorganisation were necessary in relation to reality (Luchinger, 1981). Structuralism interprets structure as ordering the signifiers. Hence ordering could be considered as a process, not a fixed non-changeable property of a structure. Structural order leads the process in such way that a certain result is achieved. The order of process maintains the system.



The self-organisation of a structure is an activity that can be carried out only by purposeful entities. It is the relationships between what the purposeful elements do and the pursuit of their common purpose that give unity and identity to their organisation.

### 1-3-8 Hierarchy

Structuralists always see the hierarchy as a dynamic process, as a constant regrouping. For them hierarchy is the mutual subordination and super-ordination of components in a state of constant regrouping. In this process components have a decisive significance for the total meaning of the structure, which constantly changes as a result of their regrouping.



A *structural hierarchy* could be assumed to be a kind of patterning, implying interaction between elements with the manner in which the relations express themselves in reproduction or the continuity of interaction in time.

According to the concept of *field*, which is borrowed from thermodynamic thinking as background of structuralism thought, any *unit* that is part of a *field* is significant for physical process chiefly in so far as it is constitutive of, and constituted by, a higher order. This hierarchical property is not an aggregation of elements, but an expression describing a set of relations between things governed by some overriding formative laws. Self-regulation within structures can be seen to correspond to the laws of hierarchy.

Piaget (1968) explains that the ordered relations of the structural elements give rise to a specific activity of *ranking* and lead to a distinct classificatory activity and the setting up of correspondence becomes quite systematic. Levi-Strauss refers to hierarchy where he says that every form is content for *higher* forms and every content form of what it *content*.

Waddington (1977), talking about *structural hierarchy* and *functional hierarchy*, claims that there is structural hierarchy in all nature, both living and lifeless. He suggests that *being hierarchic* requires that the system controls its dynamic through an internal record which has some aspects of *self-observation*.

### 1-3-9 Structural performance

Performance is another aspect of structural properties. Structures are inseparable from performance. For structuralism, the concepts of function and structure are closely connected (Mukarovsky, 1978).

There is a mutual relationship between the physical manifestation of a structure and its functions. Boundon (1971) believes that the structure takes its meaning from its function. The use of the term *structure*, in whatever context, corresponds to a function, which can easily be described.

With self-regulation structuralists come back to some sort of functional activities. For Parsons (1960), structure and function together belong, accordingly, to a *total system*

that is conserved by *regulations*. For Levy, who reduces structures to observable uniformity, function comprises the diachronic manifestations of structure.

Parsons links function to the *values*, which is important in the social context of structuralism. Values do not have structure by themselves, except that they are based on *norms*. Values seem, then, to point up a distinct dimension, the dimension of function. Social structures concerned with norms exhibit *operational* character.

Structuralists observe an underlying structure in relation to the operation of its mechanism. This means that it is possible to deduce logically the behaviour of a mechanism to its structure. Within a structure the general relationships of the elements give the whole its behavioural properties and so it is more important than the precise properties of each of the components. So, by considering the abstract structure of a system, deducing its properties and predicting its behaviour is achievable. The two fundamental notions, that of *function* and that of *identity* are related. They constitute structures in the sense of *categories*.

Although there is a mutual relationship between structure and function, this is based on the context, organisation or environment in which the structure grounded. Function is never determined by a particular structure itself, but only by the context of the organisation and the environment in which this structure is embedded. Structure is not determined by function alone, since many different structures can perform the same function.

A living structure's functioning is always tied to the functioning of the total organism. The subordinate function (in the biological sense of word) is definable in terms of the substructure's relation to the organism's total structure. In biology this tie between function and structure can hardly be denied (Piaget, 1968).

Any structure has a system-control function. In the words of Ackoff *et al.* (1971), functions of a system are the production of the outcomes that define its goal and objectives. In other words, to function is to be able to produce the same outcome in different ways. According to him, pursuing the goals of a system is its function. A part of the function occurs when a system is adapting to a change in its environmental and/or internal state.

## 1-4 Deep structure and Surface structure

A structure is considered as an abstract set of formal relations underlying the greater manifestation of observable forms.

Chomsky (Eiseman, 1994) distinguishes between a *surface or perceptual structure* and a *conceptual or deep structure*. Deep structure is specified an abstract underlying order of elements that makes possible the functioning of transformational rules. The rules map deep structures into surface structures. It is then seen as a generative or transformational process, not only as a system of visual relationships. Deep structure in his opinion is partially defined by *universal rules*.

By distinguishing between *deep* and *surface* structure, Chomsky allows for both description and formalisation. He sees only two alternatives, either an innate schema that governs with necessity, or acquisition from outside.

In scientific theories, *deep structure* means that the criteria and essential components of identity cannot be detected in a straightforward manner by just *looking at* the surface appearance of the concrete objects instantiating them (Balzer *et al.* 1996).

Structure as certain type of theory explains a set of phenomena it underlies, by showing how they could be generated by the application of transformation rules to an underlying structure. A *surface structure* thus is the *transformation* of a *deep structure*. Deep structure is fully equivalent to the normal meaning of the term *structure*. It is in the deep structure and its transformation rules that *generate* the surface structure. The deep structure concept is equally a theory, to be related deductively to *observable* in normal scientific fashion. Formal models for this general relationship - structure → transformation rule → observable form - have been found in various branches of mathematics and logic. It is necessary to say that structuralist studies have only begun to scratch the surface from this point of view. Structuralism proposes deep abstract formation as the basis of richness and variety and its applications returned structure to the surface level (Hillier *et al.* 1972-3).

Assiter (1984) argues that structures are the real things which underlie the appearances, and which are usually opaque to the eye. As Marx observes if there were no difference between the inner structure and appearance of things, there would be no need of science. Hillier *et al.* indicate (1972-3) that Marx believes in the difference between the inner structure and appearance of things. He also mentions that Gestalt psychology, with its emphasis on perceptual wholes, has tended to sustain the belief that the modern concept of structure has to do with the *gestalt* form of an assemblage at the observable level, the relation of appearances to these underlying structures.

Structure for Levi-Strauss is not given in observable reality. Based on this idea, his works lead towards seeing structure as essentially dynamic phenomenon. There is in fact an ambivalence between the kind of structuralism, which views structures as an abstract model derived from an analysis of phenomena seen as a static system of differences, and the notion of structure as an inherently dynamic aspect.

The linguistic term, deep structures represent the basic grammatical relations. Transformation is then applied in order to derive the surface structure.

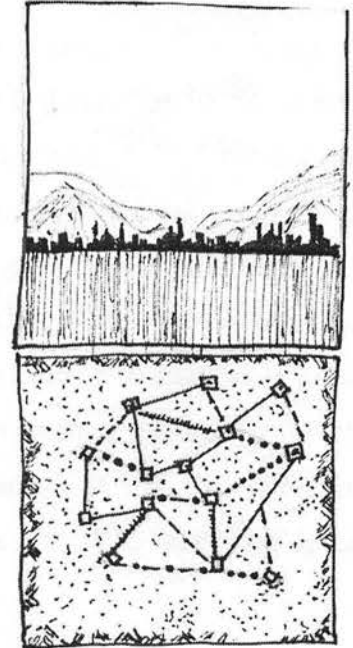
The structural analysis of a system may be defined as a theory that allows for the deduction of apparent characteristics. In reverse, it could be used to deduce the structure from its apparent characteristics (Boundon, 1971).

The two characteristics of analytic structuralism, *deep* and *surface* are necessarily connected; in fact, the search for *deep* structures is a direct consequence of the interest in the details of the laws of transformation. Piaget (1968) explains that, once this is recognised, certain striking analogies between structuralism in anthropology and physics, become apparent. The social structure, like causality in physics, is a theoretical construct, not an empirical given. It is related to the observable social relations as, in physics, causality is related to the physical laws. Piaget refers to Durkheim's thoughts that behind the *concrete* social relations there is always a *conceptual structure*, discoverable only by elaborating abstract structural models.

Whereas *global* structuralism holds to system of observable relations and interactions, which are regarded as sufficient unto themselves, the peculiarity of *authentic (analytic)* structuralism is that it seeks to explain empirical systems by postulating *deep* structures

from which the former are in some manner derivable. Structures in this sense are ultimately logio-mathematical models of the observed social relations.

For Boundon (1971), the concept of structure is very close to the concept of *essence*. What classic structuralism desires is just this essence, a pure *form* beneath the observable *content*, which produces an effect from the repetition of merely relational oppositions. He claims that *deep structure* and *morphological surface* change in time and space, with stability. Rossi (1982) believes that the morphological structure, which weaves the parts together, is abstract and material at the same time. Thus structure is a reality, which is immaterial but manifests itself materially (Mukarovsky, 1978).



Hillier (1996) discusses some of the physical characteristics of the structure. A structure grid, is one in which integration and intelligibility is arranged in a pattern of some kind, which supports functionality, and intelligibility, to varying degrees, in order to create a system of differentiation, and it is this differentiation that is called structure in the system. He also comments that the physical character is a fundamental characteristic of a configuration and that the addition or subtraction of an element could cause properties of the whole configuration to change. On the other hand, there is some degree of local determinacy from configuration to its structure. He mentions the importance of physical aspects by saying that to believe with some that 'structuralism' may reveal the hidden aspect of things or even to wonder whether structures describe the essence or the deep meaning of things prevents one from understanding the concept of structure.

Eiseman (1994) talking the structuralism point of view, further, was interested in *internal structure*, that aspect of the structuralist insistence on structure, that goes beyond function to look for the *innate structure* or *order of things*. All this he constructed with the hierarchical order. For them, the surface level corresponds to physical aspect of architecture, and the deep level corresponds to the syntactic aspect.



Deep structures concern implicit, underlying relations, an abstract order. Deep structures provide an abstract conceptual framework for the formal regularities.

Eiseman (1994) see Chomsky's idea of deep structure as a model for describing the processes through which the physical aspect of architecture is derived or generated from a series of abstract formal regularities, another level at which formal relationship interact. Of the two formal structures, one is received from the actual environment and the other is latent and only potentially received the deep structure conditions the way everyday forms are perceive. Deep structure describes formal regularities and their transformation into a specific environment, while *prior condition* is a description of the formal regularities that are juxtaposed in such a way as to produce a relationship with the actual geometry of an eventual building. As Gandelsonas puts it, deep structure allows for an analysis of the interaction of the surface and deep structural levels (Eiseman, 1994).

According to Herbert and Thomas (1982), structuralism was concerned with grasping the meaning of underlying structures. It was a holistic scheme that viewed patterns and processes as largely affected by structural imperatives.

## 1-5 Structuralism in architecture and urban studies

Structuralism has only recently begun to be explored in the environmental sciences. The structuralist viewpoint provides the basic and substantial theoretical core for urban structure. General System Theory also affected on urban environmental studies. It was Herman Hertzberger who put structuralism into practice on a city (Heuvel and Van, 1992).

The aim of the movement called structuralism according to Hillier (1996) is to assign abstract formal models with structure and variety manifested in the space- time output of such systems.

Forrester (1969) describes an urban area as a *complex system*. He explains that the phrase *complex system* refers to a high-ordered, multiple-loop, non-linear feedback structure. All social systems belong to this class.



According to structuralists, social structure may be viewed as the trial, which determines the social distribution of space and evolution of urban spatial structure. Their interpretations of the urban structure are concerned with the ordered relation of parts to a whole, in which the elements are linked together with a *structural hierarchy*, implying relations between them and the patterning of multiple interactions.

The root of Doshi and Alexander's ideas (1963-4) on urban transformation matches structuralist ideas on transformation. They apply the four urban rule systems to the central of change (transformation) in urban spatial structure when he claims that: the environment gets its spatial structure, not by sudden design, but from continual growth and change. These changes are far from random. They are controlled, at any given moment by a system of rules; legislative rules, rules of incentive, and unspoken rules of habit.

Luchinger (1981), in his interpretation of structuralism in urban and architectural fields, mostly refers to surface structure. He believes that, by nature, structuralism is concerned with the configuration of conditioned and polyvalent spatial, communicational, constructional or other units of form at all urban scales. Structuralism is also based on the expectation of finding articulated buildings within the overall urban structure. In his discussions of articulation of built form or anti-amorphism he claims that the structuring of a building volume is one of the fundamental principles of structuralism. So, structuralists concern with two things:

- The articulation of the building block into smaller units that are humanly comprehensible (anti-block movement), and
- The articulation of the urban building fabric (Luchinger, 1981).

Hillier (1984) believes that a society is a global-to-local phenomenon and there is a distinct global structure over and above the level of the everyday interaction. The global form retains a certain *structural stability* so that we can see it and point to it in much the same way as we would see or point to an object. He states that the fundamental proposition of the syntax theory is not that there is a relation between settlement form and social forces, but that there is a relation between the generators of settlement forms and social forces.

Hillier *et al.* (1972-3), in their discussion on *aggregate mode* and *structural stability*, regard both physical and social forces and so relations between surface and deep structure in the urban arena. These claim that the internal structure of lower-order forms are connected to higher-order forms which are connected to higher-order structures are called *aggregation modes*. The aggregation modes give rise, by elaboration of the defined spaces, to an equally limited number of *structurally stable morphs*, where structural stability is accounted for both in terms of physical and social factors and in terms of the evolution of the spaces. In this regard, they are concerned with the more interesting forms of structural stability in socio-spatial morphs where elaboration has led to a property of denseness, and thus the metric properties of the space that contribute to structural stability.

*General System Theory* originated from an attempt to utilise these lines of thought. Theories of the stability of any natural or artificial system, including the ability to generate change, must be in space-time, not in three-dimensional synchronous space. A situation of structural stability at any particular point in time may be understood but it will not be explicable on the basis of the synchronous interaction of elements. The evolutionary paradigm requires man to see himself as a designer (Hillier *et al.* 1972-3).

Hillier *et al.* (1972-3) believe that the traditional approach to urban modelling that of relating patterns of activity to patterns of space, links structure and variety, logical deep structure and morphological surface, and change in time and space to stability. Structural stability is accounted for both in terms of physical and social factors and in terms of the evolution of the spaces.

Bourne and Simmons (1978) write that many different principles (or forces) combine to determine the spatial organisation of an urban system. The military, the church and the process of public administration each creates its own pattern of structure, flow and growth. They claim that multi-purpose urban systems co-ordinate the flows among many different economic sectors and affecting social relationships as well.

For Smith (1975) the meaning of structure matches the surface structure. He indicates that each part with its own structure merges into a structure on a larger scale. The connectivity of all is suggested by a tree-ways branching form. Both separation and continuity are interwoven and demonstrate the relationships between various features at

a single scale, and between the units and aggregates on different scales. Branching structures start from a point and grow. Structures on one level, by their imperfections or variations, always give rise to a new kind of structure on a larger scale.

Giddens (1984), argues from a social structure point of view, that structural principles can be understood as the principles of organisation, which allow recognisably consistent forms of time-space distinction on the basis of definite mechanisms of societal integration. He believes that:

- Structural principles are the principles of organisation of societal totalities;
- Structures are the rule-resource sets involved in the institutional articulation of social systems; and
- Structural properties and the institutionalised features of social systems, stretching across time and space.

Regarding the previous discussions on surface and deep structure, it would be possible to identify the surface structure of urban situations as the morphology of urban life, the street and the square, the purposive forming of ambient space and the containment of a vast richness of human activity. The deep structures represent the basic elements of human behaviour and motivation, ecology, political, economic and social factors, which form the resource base of urban structure.

Adlo Van Eyck ( in Heuvel and Van, 1992) observes large, significant structures in cities, which are recognisable to all city dwellers, through which every city dweller can recognise himself from place to place and day to day, freely and in accordance with his own real needs.

Luchinger (1981) sees urban structure as being both growing and relatively fixed to certain locations with mixing mechanisms. For him the socio-spatial duality is fundamental in the urban system. The system needs to operate at two levels, not one. The duality is a property of a socio-spatial insofar as it constructs a global order based on its local elements. The system is considered as a local-to-global phenomenon. But there will also be a global-to-local system that exists over and above the domains of individuals, and which expressed itself in some collective or public nature.

Luchinger's (1981) point of view on urban structure refers to the surface structure when he regards the grid as the most striking feature of structuralism, together with the configuration of formal units. Ackoff *et al.* (1972) also argue that structure is a very general concept that includes geometric, kinematics, mechanical, physical, and morphological concepts.

## 1-6 Conclusion

Structuralism is a method not a doctrine that locates research to a fixed discipline and methodology, although its doctrinal consequences have been quite various. Notion of *structure* has obtained a vast range on account of the many contexts, or fields of science that have found it applicable. Structural analysis leads to a dialectical understanding. Structuralism as a methodology can be considered appropriate for examination of phenomena in a holistic way.

Methodologically, it analyses large-scale systems by examining the relations and functions of the smallest constituent elements of such systems. Structuralism values deep structures over surface phenomena.

Based on structuralist beliefs, structure is in all cases some set of logico-mathematical relations that underlies morphological variety and give rise to properties of systemness. It could be considered as a purely conceptual underlying entity to the observable elements manifested in a thing or in a place.

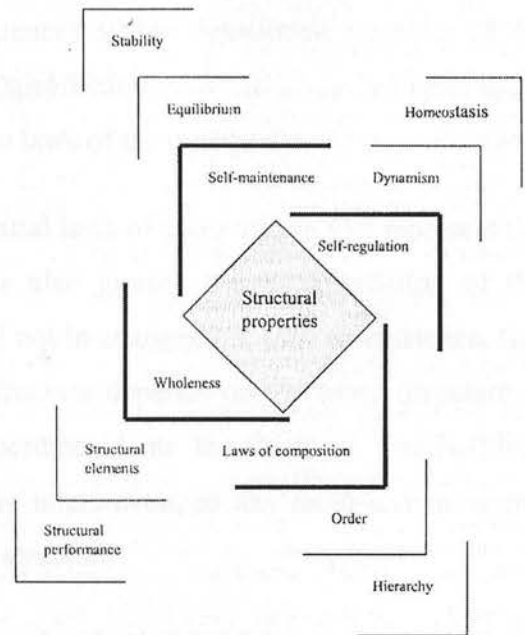
Many structuralists agree on the properties of the structure. The foremost is transformation and self-regulation. Other properties include wholeness, dynamism, hierarchy, self-organisation, self-sufficiency, reproduction, reconstruction and reorganisation, stability, growth, cohesion etc. Some of the properties are far removed from the physical nature of structure.

Structure is a system of transformation. It depends on laws of transformation. The concept of transformation is based on the evolution of the surface structure. This concept covers the dimension of time. The transformation of structure depends on

information or programmes that lead the structure from a lower level to a higher level of complexity.

The dynamic relations of a structure's elements are its specification and consequence of structural change and transformation through time. The dynamism seeks internal equilibrium in the system structure within an ever-changing context or environment.

A structure is an internal account of the transmission of stability and the generation of variety. It also includes the ability to generate change in space-time from a simpler to a more complex structure. So time and change come to be increasingly important dimensions in the study of any artificial domain. A structure is a systematic whole of self-regulating transformations that maintain a process of internal equilibration. Self-regulation is met through the laws of formation and of transformation bound together which



involves the idea of function. Self-maintenance, homeostasis, equilibrium and hierarchy are different aspects of self-regulating property of structure. Self-regulating implies that structure can continuously change its rules through series of selections to keep an ordered and stable state.

The concept of transformation helps researchers to study the evolution of social phenomena. According to this, the evolutionary process in each phenomenon is guided by its unique structure. Any structure only belongs to a particular phenomenon, which is continually in change and its results are manifested in the phenomena. Structural stability is accounted for both in terms of physical and social factors and in terms of the evolution of the spaces.

In structuralist thought structure and transformation are bond together and the relation of both is reflected to the surface appearances of phenomena. Accordingly, the structure could be approached by investigating the evolutionary process, which have transformed



their entity while keeping its identity. The transformation approach is thus able to show connections between different observable forms over time and to explain connections in terms of structural laws that underlie these sequences of forms.

Based on the core idea of transformation and the notion of generation as structural properties, structure is non-temporal. The structure of the past produces the structure of the present.

Structure is defined as a whole, which influences all the constituent elements of the structure but is independent from them. The specifications of the whole are prior to its elements. The whole is the consequence of the laws of composition.

Structure has its own unified system of structural laws of composition that represent the character of structured wholes. These laws also govern the transformation of the elements, which they structure. The laws deal not in changes but with co-existence. Not only, the existence but also function of a structure depends on the laws. Structure is composed of interconnected elements subordinated to the laws of composition. Structural elements and their relationships are interwoven, so any modification in one element influences on the global entity of the structure.

Structural elements are linked together in an ordered relation of the parts to the whole. The order is a process, not a fixed empirical property, and leads to certain results such as hierarchy as a dynamic process. Structural hierarchy implies organised interaction between elements. Self-regulation within structures corresponds to the laws of hierarchy. It controls the dynamic nature of the structure through the need for internal equilibrium.

The concept of structure and function are interconnected. Structuralists consider self-regulation as a sort of functional activity. The behaviour of a system is related to its underlying structure. The relationships of the elements give the whole structure its behaviour. The structural function influences on the whole structure identity. The context and the environment of the structure determine its function when a system structure is adapting to a change in its environment. In sum, following the goals of a system is its function.



The two concepts of deep and surface structure describe a crucial distribution. Deep structure is the abstract, underlying order of inherent laws that makes possible the transformation of the elements. It is the deep structure and transformation rules that generate the surface structure. Surface structure is manifestation of the basic relations of the deep structure. The deep structure is immaterial but manifests itself materially in surface structure. Structuralist interpretations of urban and architectural phenomena mostly refer to surface structure. The surface structure of urban situations is the morphology of urban life, combining patterns of activity and patterns in space of many different structural forces like social forces. Deep structures represent the forces of human behaviour, political, economic and social factors, which form the resource base of urban structure.

## Chapter Two

# Chapter Two

## The City Structure

The following discussions are established to discuss the concept of city structure based on stratification, structural properties and related works. The city structure and its properties of hierarchy and complexity regarding the city make structure as its entity. To achieve this goal, the study benefits from a number of research publications of different city case studies and from research findings and approaches for directly or indirectly indicate the existence of the city structure.

The approach is to use the analogy between the structural properties and applicability of deeper levels of the structure in the built environment in particular a city using the literature review. The review discusses literature that regards a city as a living organism or a system. Finally, the idea of this group of scholars indicates how the existence of a city and its vitality is explained by an analogy phenomenon called city structure.

To achieve the aim of stratification to identify and explain the role of the city structure with its structural attributes and properties, the study starts by considering what other scholars have argued about the structure of cities. This is done to put forward the notion that the city structure includes the city as a whole and its sub-components.

To understand more about the city main structure, hierarchy as one of the structural attributes of structure is considered. The notion of hierarchy states that there are inter-related and well-ordered stages embodied in the city structure. This means that the city structure includes a central core of energy and also sub-cores, which flow from the central source of energy. The central energy and core of energy is referred in this study as the city main structure, which has more complex, inter-relating a more-ordered the whole body of the city structure. To do focus on the city main structure,

## Chapter Two

# The City Structure

### 2-0 Introduction:

The following discussions are established to deduce first the nature of a city structure based on structuralists' structural properties and second within the city structure and its properties of hierarchy and centrality recognise the city main structure as an entity. To achieve this goal, the study benefits from a number of research publications of different city case studies and from research findings and statements that directly or indirectly indicate the existence of the city structure.

The approach is to use the analogy between the structuralists' structural properties and applicability of deeper levels of the structure in the built environment in particular a city, using the literature review. The review considers literature that regards a city as a living organism or a system. Tracing the ideas of this group of scholars indicates how the existence of a city and its vitality is conditioned by an ordering phenomenon called *city structure*.

To achieve the use of structuralism to identify and explain the role of the city structure with its structural attributes and properties, this study starts by considering what other researchers have argued about the structure of cities. These are used to put forward the notion that the city structure includes *the city main structure* and *sub-structures*.

To understand more about the city main structure, hierarchy as one of the structuralist attributes of structure is considered. The notion of hierarchy means that there are super-ordinated and sub-ordinated entities embodied in the city structure. This means that the city structure includes a central core of energy and also sub-centres, which feed from the central source of energy. That central entity and core of energy is referred in this study as the city main structure, which has more complex, super-ordinating nature within the whole body of the city structure. Thesis focuses on this city main structure, because of its high value in urban life and transformation.

The city main structure follows the same properties of the city structure. Their differences are not a matter of scale or geographical location. The flow of energy and life all over the city is based on its city structure whilst the city main structure is the source of power and energy concentration within the entity of the city structure. The city main structure cannot be observed as a separate static entity, but can be recognised as being one aspect of city structure continuity.

The thesis is seeking a way to identify the laws of composition that exist within the city main structure. The main contribution of this chapter of the thesis is providing an understanding of how the city main structure, from the structuralist point of view, operates.

## 2-1 The city structure as living organism

The analogy between a city and a living organism is proposed by T. Sharp (1968), C. Doxiadis (1968), G. Ganilla (1995), K. Lynch (1982), A. Madanipour (1996) and others. This notion came with the rise of biology in the eighteenth and nineteenth centuries (Lynch, 1982). This idea, which has survived for more than a century, aims to describe the similarities of a living organism and city life. The concept implies that the city has an innate structure, either described as hidden structure beyond any appearances or a veritable spatial structure.

Madanipour (1996) refers to some characteristics of cities like autonomous, self-regulating, self-organising, dynamic wholes, rhythmic functions and maintaining a dynamic, homeostatic balance that are properties of structure according to structuralism ideas. But he also mentions some differences between living organism and cities, like the mechanism of growth.

Blumenfeld (1982) believes that the city is, or can be defined as, a system. He claims that the city is a social system and is not pre-programmed by genetic endowment, as is an organism. He explains the difference between a living organism and a city is that an organism can only develop within certain narrow limits of space and time.

In considering a city as a system, the city structure is taken into account implicitly or directly. Hillier (1996) talks about physical system and spatial structure in cities. Berry (1964) and Cliff (1975) use the terms of city system and spatial system to discuss subsystems by applying a system approach to urban spatial structure. Bourne (1978) talks about the nature of urban system.

Regarding all mentioned argues, the author concludes that city is a living organism with a system structure. The city structure based on its living nature should face transformation. In this regard, structuralism approach with more emphasise on transformation is considered as the best way to observe the living and ever-changing system of city structure.

## **2-2 The city structure according to the structuralism approach**

In many researchers' ideas on the nature of urban structure, structural properties according to the structuralist could be traced, even though they are not directly declared. Different aspects of the properties assert that there is a reality behind the urban environment and urban life, either partly visible or invisible, which enables the city to stay alive and active and also to provide all the necessities for the society living there. The following aspects taken from different notions regarding the city structure help the author to construct the belief that there is a city structure responsible for the whole city, ordering all the spaces and activities within the urban environment.

### **2-2-1 The city structure and wholeness**

Holistic approach is applied by many researchers on studying the city indicates the totality or unity of the system of cities and by this way, the reality of a structure is implied (B. Hillier, 1992/1996; A. Rossi, 1982; R. Krier, 1975; A. Firenze, 1978; M. Gondeliones, 1979; G. Shane, 1976). It could be concluded from Hillier (1996) that the spatial and the functional nature of the city as a whole depends on the city structure.

The city as a spatial system consists of a complex and bounded whole, encompassing a set of activities or constituent elements and the relationships among those elements, which together make up the system (Berry, 1964; Cliff, 1975).

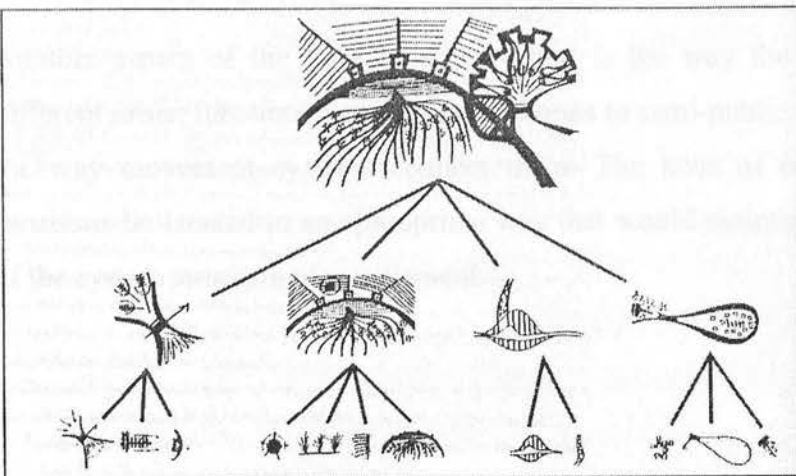
Ideas that deal with the city structure from different aspects refer to the relation between parts and the whole in the city. According to the work of Hillier (1983), the structure of urban space is a pattern of connections between local differentiation, within the context of the urban whole, and the system, which is hold together by a pattern of centrality.

Rossi (1982) in his studies indirectly refers to the property of wholeness of the city structure. He believes that the city as an entity is constituted of many parts, which are complete in themselves.

The city system is defined by the extent of interrelationships of the encompassed distinct subsystems within the larger urban entity. These subsystems may be defined primarily in spatial terms, as in the case of hierarchical industrial organisations, administrative agencies or small residential areas.

Continuity is a physical property of the city structure if it is used to integrate the whole territory of the city. In Hillier's *et al.* words (1992) it is *the continuous entity that holds the city together*. So wholeness, integrity, and continuity are embedded in the nature of the city structure.

The city structure is based on the whole entity of the city. It is a global structure, which provides the relations among local structures of various areas. It gives both a sense of identity to, and a grasp of the relations between the parts and the whole.



Source:  
Alexander Ch , 1964



The city structure links the various parts of a city, which compose the urban spaces, in a relation of continuity. It is the foundation of unity in multiplicity and diversity in a strong identical character to the city's image, and makes its identity manifest. Starting from here one can hypothesise the formation of the city structure as a whole, capable of continuity within the elements and parts. Here the parts do not only stem from functional zoning, but also coincide with settlement areas.

### **2-2-2 The city structure and laws of composition**

Laws of composition are one of the basic properties of the city structure. These laws establish relations between deep structural elements as well as surface structural elements. They identify the role and position of any of these elements within the system for determining the whole system performance. Interactions amongst all underlying forces as deep structural elements with all visible urban structural elements are organised based on these laws of composition. Law of composition regulates flow of energy within the whole system structure. The wholeness and integration of city structure is deeply conditioned by this structural attribute. From physical or the surface structural point of view, they determine how all urban districts, buildings, activities, urban axes and movement systems are related to each other functionally or physically and arranged to provide the flow of energy needed for urban life. From the deep structure point of view it refer to interaction between underlying forces, which are responsible for identifying the location of any components within the system otherwise the system will collapse, so the laws of composition bind them together. The urban spatial order is not arbitrary. Identifying the best place to locate an urban element is based on the city's laws of composition.

Another aspect of the laws of composition is the way the city structure composes different urban functions from public functions to semi-public and private functions and the way movement systems connect them. The laws of composition help various functions be located in an appropriate way that would maintain the better performance of the system structure of a settlement.

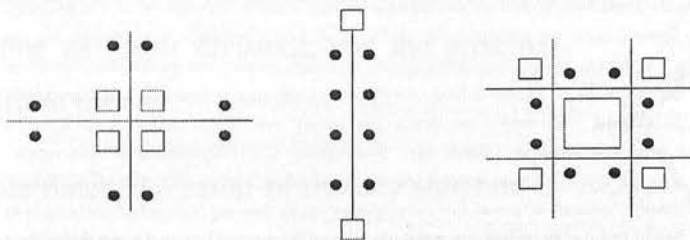
### 2-2-3 Order within the city structure

The most evident of physical character of the city structure is its order. This is not necessary a formal or geometric pattern, any kind of visible or non-visible hierarchy should be considered.

*Order* is emphasised by some researchers as the key aspect of city structure. According to Allison and Peter Smithson (1967), Louis Kahn has realised *meaningful order of spaces*. He referred to the meaningful order of structure in old cities because they give form to the order of movement and the order of spaces so that a unique organism is created.

Rossi (1982) seeks to define the formal order in cities, as an underlying logical relationship by studying how crucial and broader function of forms is to make the city intelligible. He tries to develop a systematic method for studying urban structure through urban form and typology. Rossi defines the structure of the city by two major elements: dwelling area and primary elements. In this sense, monuments are always primary elements, but primary elements are not only monuments but include any element capable of accelerating the process of urbanisation in a city. In this regard Rossi proposes the concept of a grammatical structure of the city, which is analogous to compositional laws.

Hillier (1996) argues that the city structure controls juxtaposition of uses, continuity, and integration of urban grid on which the good ordering and good functioning of the city depends. He furthermore explains that distribution of integration in an urban system, together with its associated built form and land-use pattern is imposed by this evolved structure. He calls such patterns *structure* and constructs them with *order*.



Madanipour (1996) refers to the ideas of Bourne when he discusses a set of organisational rules that link the subsystems into a city system to constitute the urban spatial structure. Bourne's approach to studying the internal structure of the city

emphasises the interrelationships in city structure not only from a physical point of view but also regarding the activities in the city. Bourne (1982) defines urban spatial structure as comprising the form (shape and internal arrangement), interrelationships (organisation), behaviour and evolution of activities (e.g. land uses, the built environment, systems of socio-economic activities, and political institutions) in the city.

## 2-2-4 Hierarchy within the city structure

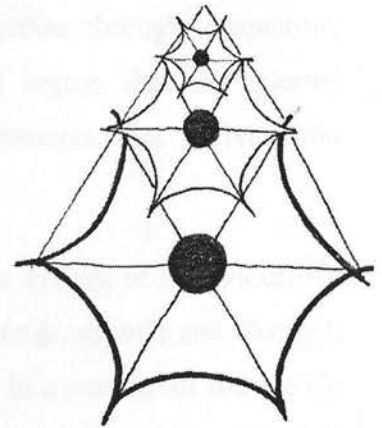
Structuralists regarded *hierarchy* as one of the major properties of any structure. Hierarchy is a consequence of laws of composition and of order within the city structure. It makes distinctions between the city structure and hierarchical systems of sub-structures.

*Hierarchy* is proposed as a property of the city structure by Alexander in his contribution to the understanding of urban structure, by describing structure as a hierarchical tree of interacting sets. In his famous article, *A city is not a tree*, Alexander reformulates his suggestion that urban structure is based on interacting sets and subsets, not isolated sub-phenomena within the urban framework. He explains that the problem within modern cities is that they are mainly tree-form structures (Grabow, 1983).

It could be concluded from Hillier (1996) that the spatial and the functional nature of a city as a whole depends on the city structure. He argues that the physical and functional order of the city depends on its global structure. He adds that a key aspect of urban structure is a tendency for the integration core to link at least some key internal areas to the periphery of the settlement.

Doxiadis (1968) describes how the structure of the city corresponds to the hierarchy of its functions, while its main axes should define its major divisions, and the principal sectors, which divide the city.

The major visible functional result of the city structure is hierarchical layout either spatially or functionally within a city. The juxtaposition of primary elements like nodes and routes or location of landmarks within districts is provided by the structure.



### **2-2-5 Function of the city structure (structural performance)**

The functions of the city structure in urban life might be reviewed from different aspects. As Hillier (1996) suggests, the function of the city structure could be considered as that of a spatial layout offering different functional potentials. The spatial organisation is thus a network of energy and communication, or a living organism, from which growth and change emerges (Luchinger, 1981). In either case, the role of city structure in city growth and change can not be denied.

The consequences of the city structure in social and economic activities and other spatial qualities should not be ignored. As Gehl (1987) indicates, the city structure consistently assembles events and people in a clear pattern, in which the public space are the most important elements in the city plan, and where all other functions are effectively located within and alongside these public paces.

### **2-2-6 The city structure and transformation**

Rossi (1982) discusses the transformational process in a city. Although his approach is from a configurational point of view it indicates particular rules in the process of transformation in a city regarding its structure. He believes that primary elements such as monuments and the city's morphology are linked at the moment of formation as stable structures. The spatial configuration of each city at any moment in time depends on how both of these physical phenomena interrelated as nuclei or crystallised forms.

The gradual evolution of urban structure takes place through a sequence of thousands of events, actions and decisions in which the parts fit together through adaptation, competition, socialisation and institutions. Bourne (1982) argues that the internal structure of the city mirrors a complex interplay of pressures that derive from competing.

Transformation in cities is described by Bourne (1982) as a system of behaviour. He believes that all system exhibit specific types of behaviour (e.g., growth and change); that is, they behave in aggregate and in terms of subsystems in a number of routine (or regular) and irregular, but observable ways over both time and space. Moreover, that behaviour is subject to a dominant set of principles (or mechanisms) that underlie its form and determine its temporal pattern of change. These principles may be internal to

the system, may derive from external sources or to a combination of both. In cities, the principal organising mechanisms that are internal, but the importance of external controls and the interrelationships between internal and external influences must also be recognised. Formation and transformation of the city is a basic purpose of the city structure.

## 2-2-7 Structural elements of the city structure

In talking about city structure it is necessary to define the elements of urban structure that help to demonstrate the whole composition. Although there are different interpretations, the major elements including the main centres, major routes or axes, districts, landmarks and natural features are substantially be understood to structure the full extent of the city with its spatial and functional relationships. Typical elements as indicated by Horten *et al.* (1982) from a macro depiction of urban spatial structure, are: linear features (e.g. transportation networks and commercial ribbons), nodes (e.g. shopping centres, individual manufacturing plants, retail and wholesale outlets) and surfaces (e.g. residential areas). The concern here is with strong elements of physical form and character, which are even manifested at the metropolitan level and which evoke powerful responses about their visual impact, functional importance and character. Where these major elements are systematically organised, articulated and related, then a strong sense of form and structure results.

According to Lynch (1982), every city spatial structure can be broken down into five elements: paths, edges, districts, nodes and landmarks. In describing the crucial elements of metropolitan form, he indicates comprehensively the city structure elements as the major path system, the major centres, focal points or nodes, the peaks of density, special activity, or access, such as shopping centres and major terminals. The spatial structure of city is thus concerned with the location of these nodal points, their general perceptual character, their relation to each other, to the path system and to the natural features. He also refers to special districts as areas of appreciable size associated with memorable activities, character or associations. In particular these include the large special institutions (universities, hospitals, etc.), ports and regions of heavy industry, principal office districts, major open spaces or recreation zones, and the special historical areas. The role of these districts in the city structure depends on their visibility and accessibility from the path system, and their general visual character. He is also



concerned with the significant natural features of the site: hills, mountains, rivers, lakes and seas.

Bourne (1982) believes that, in any given system, it is possible to identify a number of related elements or components that, in combination, make up that system. The same holds for the city defined as a spatial system. Every system, and thus every city, has a core or nucleus, which is usually the original centre, a set of member elements, definable areas and boundaries. These components act to identify the point of origin and physical size of the system, as well as to establish its location, geographical shape, and internal environment.

Madanipour (1996) in defining urban spatial structure, refers to Bourne's ideas (1982), which go further than describing the spatial elements included in the built environment and explains the subsystems of social groups and economic activities. Bourne believes that the patterns of behaviour and interaction within subsystems, when overlaid on urban form and combined with a set of organisational rules link the subsystems into a city system constitute the urban spatial structure. Interrelationships are undoubtedly the essence of the city and of urban spatial structure.

## 2-2-8 The surface and deep city structure

The deep structure and the surface structure of a city can be assumed as elements, interrelationships and organising rules. The surface aspects of the city structure indicate urban form or the spatial pattern as *arrangement* of individual element such as buildings and land uses (or, collectively, the built environment).

The surface definition of the city structure in some literature refers to the elements comprising the structure. For example Trancik (1986) regards the structure as the recognisable, coherent pattern of urban blocks, buildings and spaces.

An approach to investigating the surface city structure is by studying descriptions of city form, which implicitly refer to the city structure. This approach considerably focuses on the surface structure of the city. The study is rooted in the Chicago School's description of structures generalised in three models: concentric, sector, and multiple nuclei. The earliest classical model of the city structure, developed in 1925, suggests



that the growth of a city takes place concentrically. Urban morphology is the systematic study of the form, shape, plan, structure and functions of the built fabrics of the town and cities (Clarck, 1985, Small & Thrick, 1986). The sociologist Burgess also suggests that the city's spatial structure could be viewed as a set of economic zones centred on the city downtown.

Trancik (1986) refers to the discussions of Fumihiko Maki on the city structure, which indirectly consider the surface structure as a framework. Maki addresses the act by which we unite all the layers of activity and resulting physical form in the city. This approach is concerned with making an extremely large entity comprehensible by articulating its parts. Maki defines three different physical forms resulting from urban structure as *compositional form*, *mega-form*, and *group-form*, alternative ways in which their individual components are integrated into a larger framework in a hierarchical, open-ended and interconnected system. He claims that mega-form linkage is physically important to make the structure.

The deep city structure is the underlying set of interrelationships, linkages and flows that acts to *integrate* the pattern and behaviour of individual land uses, groups and activities into the functioning entities that are its subsystems; the social groups, economic activities and public institutions within an urban area. The city structure formally combines an urban form and an overlay of patterns of behaviour and interaction within subsystems with a set of *organisational rules* that link these subsystems together into a city system within the structural dimensions of the city's physical and social space.

Considering various types of structures in its general concept, and according to the different interpretations about the city structure, surface structure is the physical manifestation of the underlying order in the city but the deep structure refers to the socio-cultural norms and values with great influence on visible characteristics of urban structure.

*...They refer not to the surface appearances of forms but to deep structures underlying spatial configurations and their relation to living patterns. Systems of organised space and cities have deep structures, which vary with culture patterns (B. Hillier, 1996, p.38).*

The term *hidden structure* is used by Herbert (1997) to express the realities underlying not only the physical structure of a city but also all of its human activities, stressing the broader contexts within which urban structures are formed.

*The notion of hidden structures and the impacts of dynamic change in societies have dominated Marxist approaches to the city. There is more than one type of hidden structure, structural symbolists working in the cultural/ symbolic tradition. From the economic base or structure develops a superstructure of social and political institutions, legal systems, religions, and customs. All human actions are underlain by hidden structures. Explanation, therefore, cannot be found in observed phenomena or spatial outcomes but must be sought in the general structures to which these relate (D. T. Herbert et al., 1997, pp. 12-13).*

Social and spatial structures are related to and affect each other. Levi-Strauss (1969) indicates that there is an identifiable relationship between the social structure and spatial structure of settlements. Spatial configuration is the mirror image of social organisation. Levi-Strauss sees the spatial forms of settlements as *projection or reflections of mental processes*.

Bong (1978) refers to a further understanding of city structure. He writes that a city has both an objective physical structure and a psychological or cognitive structure. The psychological structure is termed the mental map or the perceived city.

The city structure is mostly observed from its physical aspects. Although the structural properties according to structuralists could be traced in the definitions about the city structure but rarely the deep structure are considered.

Hillier (1996) claims that city structures can not be seen all at once, nor are they imposed all at once by minds. They are *asynchronous*, both in their genesis and in the way they are experienced and made intelligible through the process of living in the town and, most especially, by the process of movement.

Lynch (1982), in his argument on a sense of place, explains that structure in a city fits parts together and makes it easier to identify a place. In a large settlement sense of place is the sense of orientation that allows a person to fit this structure into the metropolitan picture. To him, intelligibility is an ideal and essential quality of the city structure

derived from its physical characteristics. It regains unity as well as diversity. The city structure through its movement system shapes the part-whole structure of the city.

The city structure influences the process of forming images of urban environment. The city acquires its global form from its physical structure as Bacon (1974) indicates, form should derive from, not dictate, the structure. Consequently, the spatial configuration of each city at any moment in time depends on how the correlation between outstanding features established, on how public and private spaces and arenas are interrelated as crystallised forms by assistance of its city structure.

A comprehensible city structure defines the elements of the sub-system and the rules for their association. It is both a vocabulary and a grammar. The city structure composes many systems that exist in the city. The system has the further quality of a structural correspondence with the functional organisations that inhabit it, because its purpose is to provide a setting for everyday life.

The city structure is responsible for urban functioning, which could be mirrored at the surface level. There is also deep structure in every city that is not arbitrary. It has inherent laws, rules, forces and properties. the rules as an abstract model to the structure of the city, written or not written, embedded in the society.

The deep structure is the internal organisation of cities, which exhibits specific physical characteristics and has great influence on shaping the growth of the city. The deep structure addresses the cultural, social, political, and economic contexts in which the physical surface structure takes place and focuses on the dynamic interrelationship of these aspects.

The city system is innate. It receives resources, accommodates them, and absorbs them into the urban system according to the laws of composition. The city structure order is a result of the composition law. Hierarchy is one of the city structure laws of composition. Hierarchy could be traced in every aspects of the urban life and spatial structure of the whole city. There is hierarchy in spaces for example from public to private and in the urban functions because the hierarchy is inherent in the nature of the structure. Regarding this property, the city structure as a whole entity consists of several entities; the city main structure as super-ordinated structure of highest level and the subordinated structures, which are in the lower levels.

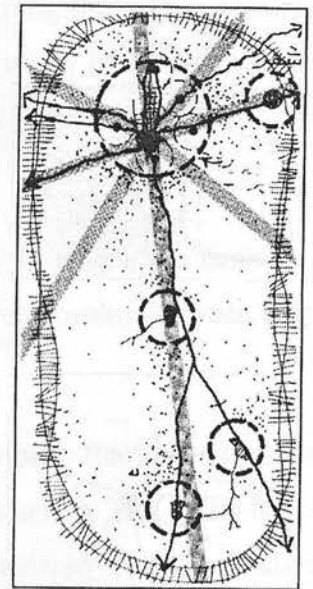
Building this concept helps to introduce and actualise the notion of the *city main structure* as the super-ordinated structure within the city structure. This super-ordinated structure plays a central role and function in urban life. In other words, the city structure consists of a central part, in this research called *the city main structure* and the rest of the city or the peripheries.

## 2-3 The city main structure

The city structure and the city main structure are two distinctive entities. According to the mentioned property of compositional laws, order and hierarchy for the urban system structure, the city main structure is placed on the highest level of the city structure and is considered as the super-ordinated structure in the city structure.

The city structure is embedded the city main structure and other sub-structures. The super-ordinating character of the city main structure implies that functioning of the sub-structures is based on the messages and instructions shaped by the city main structure. The land uses of sub-structures should follow the rules and regulations made in the central area or the city main structure. The sub-structures have the same properties as the city structure because of its holistic nature but rather these differently with a local domain.

The super-ordinating city main structure is more complex in nature and more ordered than other parts of the city structure. It has surface and deep aspects of structure. It has self-regulation, transformation, as does the city structure. The city main structure is the major source of order in the city and the other parts follow the order. The sub-structures in a city have less complex deep structure as well as less compacted surface structure. Because of the greater intensity of the deep structure, the city main structure in its surface level is more condensed and more varied than the sub-ordinated parts of the city structure.



The main structure concept within an urban system implies that particular parts of the system, and especially the public areas of a city, which are assumed to be used and benefited from by all the citizens, are not of the same level of importance as the other areas. The areas are considered as the main city structure because they are the source of energy and decisions for self-regulating and transformation of the urban system. It is a value-focused area. These distinctions could be physical and functional or belong to other aspects of the city environment.

The city main structure within the whole body of the city structure is responsible for making decisions and for the growth of the city, where the centre of activity, communication and developments are very concentrated with connections to the peripheral sub-structures. The peripheral parts of the city structure are connected to the main structure and communicate with it in the form of flow of people, energy, transportation and the communication of different land uses. The centrality of the city main structure is a consequence of the hierarchy as a basic property of the city structure.

### **2-3-1 Centrality of the city main structure**

Centrality is a property of the city main structure based on the concept of hierarchy and order of the city structure. It makes the distinction between the city main structure and the rest of the city structure. The city main structure has strong tendencies towards centrality to enhance its driving force, energy and power in urban life. Although the centrality embodied in the city main structure is subjective, it is also a locational and distributional power.

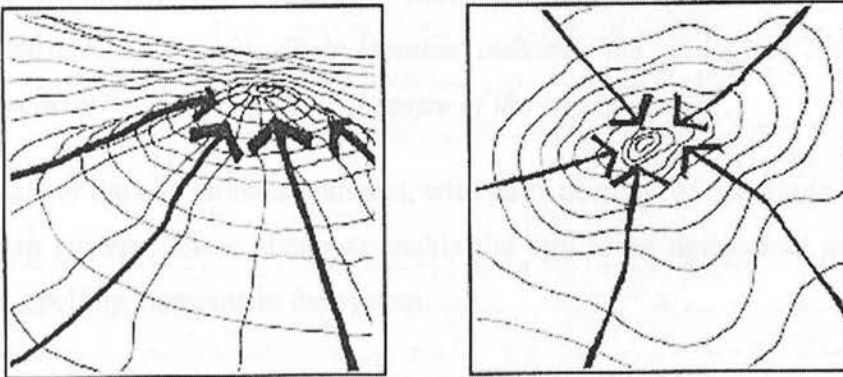
The research focuses on the city main structure because it is where the centrality emerges, where the condensation emerges, where the clearest relationship between deep and surface structures appears.

Hierarchy and the centrality are the two interacted characteristics that the city main structure derives from the tendency to be geographically in the centre. The centre is not a geographical phenomenon but it is an expression of the tendency in the collective mind of the city and the people towards the centrality. The centrality in connection to the city main structure from the theoretical point of view, from distribution of energy and flow of the land uses and activities, tends to be located in the centre.



The city main structure is the place where all central decision-making and planning policies, which are an aspect of manifestation of the higher order of the city main structure, take place.

The centrality of the city main structure provides a kind of centre of gravity. It could be likened to a volume formed by a heavy weight on a surface, which causes high attractions to other parts of the surface towards it. The gravity is the result of the concentration of all kinds of energy within the city and provides the highest level of power in the urban existence, in its daily life and in the future development, being the centre of attractions, decisions and source of transformation. The greater the concentration of activities, services and wealth within the area, the more gravitational energy it exerts upon from other parts of the larger area and the greater the importance the public domain gains within the city structure. Consequently, the number of activities within the area increases and the variety of events - which is again a reason for an increased attraction - grows. The public value, social dimension and high-level, large-scale relationships are basic definitions of the main structure. The main structure is the area in the city where everything can happen that does not necessarily take place anywhere else in the city.



Hillier (1996) argues that centrality governs the depth effects on the global system of a city. For him more centrality means more integration, which prioritises the centre from the point of view of known effects of integration on the functioning of the spatial system.

Lynch in describing good city form (1982) identifies a city as a large-scale system of connection. If the foci are sufficiently dense and sufficiently differentiated, one can



memorise the set and every location in the region now *placed*. The foci may be organised into a hierarchy: main centre, sub-centres, sub-subcentres and so on.

## 2-4 Structural properties of the city main structure

**Wholeness:** The city main structure's impact on the whole city is based on its centralising function. Davis (1983, P.14) discussing the city centre, indicates:

*The city centre has traditionally held the urban region together and has at the same time reflected the strength and nature of the wider area.*

Manuel Castells (1977, p.225) in describing the characteristics of the urban centre testifies to the combination of certain functions and activities that provide communication between the elements of urban structure. To him, the urban centre must be defined in relation to the whole of the urban structure. He also writes:

*A classic text by Johnson defines the centre as “ the area in which are situated highly specialised persons and institutions, which exercise a role of direction, co-ordination and influence over the market activities of the whole metropolitan region. Their location indicates the ecological centre, but not necessarily, the geographical centre of the region.*

The elements of the city structure interact, with large portions of the whole city or better to say urban system. These elements enable the city to be understood in its totality. They are propelling elements in the system.

**Structural performance** of the city main structure could be deduced from the ideas of Hillier (1996) on *integration cores*. By applying this term, he emphasises on specific parts in a city. He claims that the integration core possesses a fundamental functional property in urban system, which is reflecting the process of constructing a differentiated structure in the system not only a picture of a current state of the system, but a kind of structural record of the historical revolution of the system. The *structural inertia* imposed by this evolved structure is of course also the prime constraint on the future evolution of the system.

The high concentration of energy, activity and built form provides specific situation for the city main structure regarding its role in urban life. Spreiregen (1965) states that the responsibility of the centre is heavy, developed out of the most strategic point in cities. It contains the highest concentration of services for the whole community.

Because of the gravity exerted by the power of its centrality, the main structure is the arena of social intercourse either inside the buildings or within the urban spaces and also in urban grid, which serve the high movement. Daily activities, as well as ceremonial events, mostly take place within the zone.

The performance of the city main structure is conditioned by its accessibility from all over the settlement. This accessibility has two aspects: physical or geographical location, and the nature of its land uses. The geographical location of the city main structure within the whole territory of a city is as important as its public accessibility. The value of the zone, in comparison to that of other districts, arises from the public accessibility of spaces within the area.

The city main structure's **dynamism** relates to the importance of its fundamental function, to the distribution of integration in an urban system, together with its associated built form and land-use pattern. Public spaces are highly dynamic. The number of users of the spaces and the level of commuting within the street network, social communication, economic exchange and political decisions, are other sources of dynamism of the city main structure in urban system.

The dynamism is the outcome of concentrated energy within the city main structure, which is the result of the channels of movements of people and goods within a city. According to Banerjee *et al.* (1990), this area converts to stable focal points of stimulus and change.

Madanipour (1996) refers to urban dynamism but he believes that understanding of development process will not be complete without addressing the social and physical contexts in which it takes place and focus on the dynamic interrelationship of these aspects. The social relationships mean the dynamism and change within urban space.

**Transformation** in the city main structure is a continuous movement towards more complexity in various aspects of urban structures. It is a consequence of dynamism. This

structural property is implicitly referred to by several key figures. Regarding Aldo Rossi's interpretation (1982), the fixed elements of the urban system in the dynamic process of the city tend to be more actively preserved but continuously presented as propelling elements of development. They are closely bound up with the origins of the city and can be seen as an actual urban artefact, identifiable with an event or an architecture that is capable of summarising the city.

According to Karimi (1998) the elements of the spine of a city are able to produce a significant role in urban structure since through time they continuously accumulate the physical and social values, which make them the elements of identification for the city. They crystallise urban history and are locations for the *collective memory*.

The city main structure is the mirror of physical aspects of city's transformation. The city main structure consists of those parts that were the original nuclei of the cities, the mature core within the whole city. The sense of evolving durability crystallises different stages of physical manifestation of transformation of the city and its particular power of changing the boundary of the area or the land uses, which might be shifted to peripheral districts.

Concluding from the ideas of Gruen (1973) and Rossi (1982), the city main structure and its primary elements are the accents and high points of the urban scene, are generators of form and contents for urban agglomerations thus remained as a focal point throughout time. Although some of its functions might change, it remains a primary conditioner of the form in which the city grows and transforms. In time, the area and its primary elements become the fixed points around which the residential parts of the city wax and wane; they are really generating elements of the city form. The city main structure as a nucleus or crystallised form of a city is also representational of the space of a city.

**Self-regulation** in the city main structure is a property inherited from the city structure bound together with formation and transformation not only within the area but also for the whole city.

Madanipour (1996) discusses the gradual evolution of cities through sequences of events and decisions in a trial and error process that attempts to maintain the internal structure of the city. He argues that spatial organisation is a response to the equilibrium

supported by decision-making process. He also regards in the self-regulating process the role of social and physical environments that are produced and reproduced through the interaction of agencies and structures, objects and contexts.

Karimi (1998) argues that the location, size and shape of urban elements, as well as their relationships to each other and to the whole city seems, to be an evolutionary product of a gradual selection in the process of *continuity and change*.

The gradual selection is a series of constructing, changing and deteriorating or demolishing of urban elements, spaces and functions in the process of urban transformation. Even the durability of primary elements is a sign of the self-regulating property of the city main structure. It means that in the process of moving from simpler to more complex phenomena, some urban functions or places are adapted to respond to the new demands of the society. Although the city main structure is the source of self-regulation, but the results of self-regulating reflect on the city main structure as the urban core is more perceivable than other parts of the city. On the other hand the city main structure is the arena of the political and economic changes in a society, which find their physical manifestations in the public arena for maximum effects.

**Laws of Composition** for the city main structure accord to the ideas of hierarchy and order, and thus apply to its centrality. Although it is presumed that the main structure is a continuous area it might consists of some recognisable parts according to their activities or physical character. Davis (1983) refers to a number of *part- centres* meaning geographical parts of the city centre; independent zones containing specialised functions.

There are a network of nodes that are concentrations of energy and activity within the main structure. There are nodes associated with different activities happening in different times of day or season. Relations and links of the nodes add to the sense of multivalency of the zone. Goddard (1982, p.436), explaining the internal structure of city, writes:

*The centre of a large metropolitan city consists of a series of over-lapping spatial sub-systems that can be defined in terms of both movement and location patterns.*

The larger structure does not annex the substructure, but forms a confederation, so that the laws of the substructure are not altered but conserved and the change is one of enrichment rather than impoverishment. In consequence, the complexity of the city main structure is influenced by the overwhelming complexity of the urban structure.

Madanipour (1996) discusses adopting a spatial classification that arrives at a land-use based organisation of space. He believes that the general picture shows a more intense use of space in the city centres, where mixture of uses overlaps and a diminishing density towards the urban outskirts, where single use is a predominant feature. This insight views urban space at a regional scale, and evaluates the diversity and complexity, which occurs across a large urban area. The relationship between these various areas, as physically exemplified by transport networks, gives us another map of the urban structure, when axes and nodes in urban patterns are primary elements in the constitution of the urban structure. Investigating meaning and behaviour in urban space starts by looking at the way the patterns of meaning and behaviour define urban space at its different scales, and how these interact with structural dimensions of the city's physical and social space.

The laws of composition of the structural elements can be observed from some angles like the functional type, scale and intensity of the land uses. A city main structure would combine all the major functions contributing to the overall organisation of the city's environment and the society's needs in such a way that a chain of various central functions supports each other.

The laws of composition provide the patterns that accommodate adjoining function - either in the form of building complexes or as main urban axes and routes. The laws of composition of the city main structure are the roots of its subordinating attribute within the whole city structure. In this regard, the type and scale of the functions are both interfere.

The city main structure is the locus of maximum concentration, which tends to extend its influence throughout the city structure and the various parts of the city. Regarding the above mentioned characteristics it is reasonable to consider the area as the basic spatial points of reference. Concentrations of energy and activity give one a sense of being in the centre and are reflected in their high land values. The intensity of the deep



city main structure quality is reflected on the intensity of the surface structure and the results are all the visible characteristics. The laws of composition organise these deep and surface aspects of various functions and spaces provided within the entire area with the highest effects on the whole urban life.

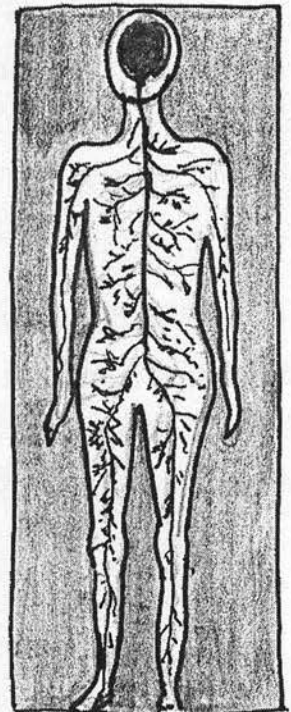
## 2.5 Conclusion

The city as an entity is considered as having a structure. The *city structure* has structuralist properties in terms of function, transformation and self-regulation. This entity is composed of a series of layered structures, which are related to each other and to the whole not only through physical continuity but also due to the society's manifestation of its identity and activities. The city structure works to self-regulate the city and gives it physical and functional order from different points of view.

The existence and manifestation of the city structure through time is based on *laws of composition, order, and hierarchy*. Hierarchy is one of the major properties in the city structure. Within this hierarchy, the super-ordinated and highest level is considered as *the city main structure*. The city main structure is a system itself, which follows the same properties of the city structure. The city main structure cannot be observed as a separate static entity, but can be recognised within the city structure's continuity and evolutionary process.

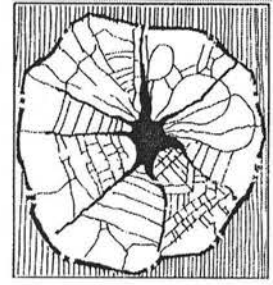
The hidden network of laws of composition determines the centre of power, stability, dynamism and transformation within the city structure, which permits the growth of a central part of primary elements, the city main structure. The outstanding property of the city main structure within the whole city structure is its *centrality*.

The centrality of the city main structure is based on its principal urban functions. This aspect of urban functions is different from functionalist' concepts of urban commercial or industrial activities. The city main structure function is the source from which all other systems of the urban system emerge. Compared to the human body, it is like the mind in





terms of making decisions. The main structure is not necessarily the centre of the city physically or geometrically but the centre of power, the location of multifunctional activities. Regarding hierarchy and centrality as structural properties, the city main structure is the highest in terms of complexity it offers to the city structure.



The city main structure and sub-centres all share the same qualities and attributes, but the city main structure is more concentrated. That centrality of the main structure is meaningful if it is connected up with other sub-centres. It is the whole system that gives it the meaning of centrality. The consequences of centrality of the city main structure are that it maintains the transformation of other parts.

Although the communities living in the peripheries of a city contribute to the city transformation from the social and economic aspects, the centrality of the city main structure makes it distinctive as the source of city-wide decision making and maintaining equilibrium among local decisions. Any decision in the central part thus affects the whole city.

The city main structure and the city structure are two levels not only different in geographical terms but in their authority, which includes the boundaries and functions. The physical concept of the city main structure refers to an area that has loaded with concentrated and flows of energies, which would attract land uses and social activities.

The city main structure is also a system with a physical manifestation. It is an organism, with vital organs. It grows and changes, because of its need to respond to changing economic circumstances and changing social patterns. To one of its major responsibilities could be considered as self-regulating in the urban system.

The city main structure's responsibility is to control the growth of the whole urban body, to give its self-regulation, homeostasis, etc. Dynamism in cities is rooted in the city main structure. It addresses dynamism and change within urban spaces. To see the city main structure integrated with time offers a dynamic approach in analysing this constantly changing phenomenon.

The city main structure is the outcome of various kinds of forces determining the internal spatial structure of cities. What gives power to that central area is the result of concentration of underlying forces. Interpretation of the super-ordination of the main structure is the result of concentration of the underlying forces (like cultural forces). For instance, cultural transformation is more evident, powerful and efficient in the city main structure because of the existence of cultural monuments, and the presence of people coming to these places for cultural activities. The cultural transformation could be stronger and more obvious in these places with more and more socio-cultural interactions. People expect to see some symbolic buildings located in the centrality of the city main structure.

In this thesis, a concept is developed about looking at cities from an angle that aims to describe the deep city main structure with certain physical and functional manifestations. The city main structure consists of a hidden deep structure and also the surface structure, that former invisible, the latter visible.

The surface city main structure's image, characteristics and perception arise from the underlying forces or the deep structure, which come from people who manifest these forces either physically or functionally. Centrality in urban structure, which is provided and supported by its main structure, is the consequence of the highest degree of interaction between cultural, historical, socio-political and economy power. In this regard the city main structure is a system of organised complexity of interacting underlying forces responsible for self-maintaining uniform distribution of power and providing the quality of life in urban environment.

## Chapter Three

# Underlying Forces as Deep Structural Elements

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# Underlying Forces as Deep Structural Elements

### 3-0 Introduction and general discussions

This chapter introduces the underlying forces as the deep structural elements of the city main structure and argues so how urban activities and urban places emerge out of the interaction mechanism of the forces.

There are two different approaches to describe the city main structure: from the surface and from its deep structural aspects, which are about the underlying forces. The underlying forces are not isolated from the ground but they are connected to the visible surface structure. The properties of the structure are the attributes that emanate from forces that are combined in the structure.

The approach of discussing different forces could either be from the standpoint of explaining the society's need for that force, or explain how the society interprets the forces into the place - the city. To discuss a force is to discuss a hidden aspect, which is the origin of the forces, and how they are brought to the surface, in the form of a building, a place or an activity, or how the public places or activities are related to the forces.

Various aspects of the structural properties of the city main structure are related or even emerge from the underlying forces. From standpoint of structuralism paradigm, *dynamism*, *self-maintaining* and *homeostasis* could be interpreted as the result of underlying forces. Following the structuralist laws of composition the spatial structure of a city is a dynamic product of the interaction between forces, which change the built fabric of the city and those that retain it. A combination of these interacting forces forms ultimately a whole picture of a city and its main structure. The ultimate result is *transformation* in the city main structure.

The underlying forces are the elements of the deep city main structure while the physical urban elements are the elements of the surface structure. Interaction between the forces is manifested on the surface structure characteristics. That interaction is based

on the *laws of composition* as the city structure property, regarding the structuralist interpretation.

*To understand the city we must first understand its material form, and most especially its spatial form; and that we cannot understand its material form until we understand the 'Laws' underlying the form - that is the 'Laws' of the urban object itself. Only through these laws can we understand the city as an object in all its social, cultural and psychological complexity (Lynch, 1980, p.5).*

the logic behind *order* as structural attribute, which determines where things are located and how one activity or part of the city is linked to other activities or areas is, highly affected by the underlying forces. The central concern in any study of the internal form and structure of the city should refer to the interrelationships of the underlying forces.

*In Duncan's (1956) formulation, the whole of the urban structure may be understood as a result of the interaction between four fundamental elements: the population, the environment, technology, and social organisation, the last referring to the ensemble of institutions and social practices (M. Castells, 1977, p.119).*

Physical environment determinants, social needs, demographic pressure, culture and religion, the power of market, agents of trade, political issues, technological development, could be considered as some of these forces.

The inherent power of revitalisation, even after the worst period of deterioration, can be considered as the *self-regulation* of the structural property and the process of *transformation*. This is dependent on the interacting mechanism of political and economic forces and on the balanced status between them.

### 3-1 Social forces

The social force is a driving force. It embodies in human beings the desire to socialise and belong to a society. According to Maslow (1954), after physiological needs, the social needs are important. They belong to a series of forces that impacts on a place the movement that a group of people starts to develop a settlement. People are

unconsciously aware of the social forces and accommodate them within the settlement structure and then interpret them onto the surface structure, to the spatial layout of the settlement structure. The need unconsciously embedded in the human soul to socialise, are fulfilled by formation of urban public places.

Responding to the social forces, social transformation and needs, leads to the necessity of public areas that belong to everybody, such that any social class feels free to make social use of these spaces. This social domain area is the city main structure, which is a physical manifestation of that social force and also a response to the social force in a pattern that exerts a particular behaviour within public places and buildings. By fulfilling their social needs, a person also contributes to the transformation of the city.

Social activities require appropriate forms of space. As Hillier and Hanson (1984) believe, spatial organisation is a product of social structure. They add that their initial aim has been to show how order in space originates in social life. It constitutes a form of order in itself, which is created for social purposes, whether by design or accumulatively. They go on to build a theory of how society, through its internal dynamics, produces order in space. The fundamental proposition of the space syntax theory developed from this exploration is not that there is a relation between settlement form and social forces, but that there is a relation between the generators of settlement forms and social forces.

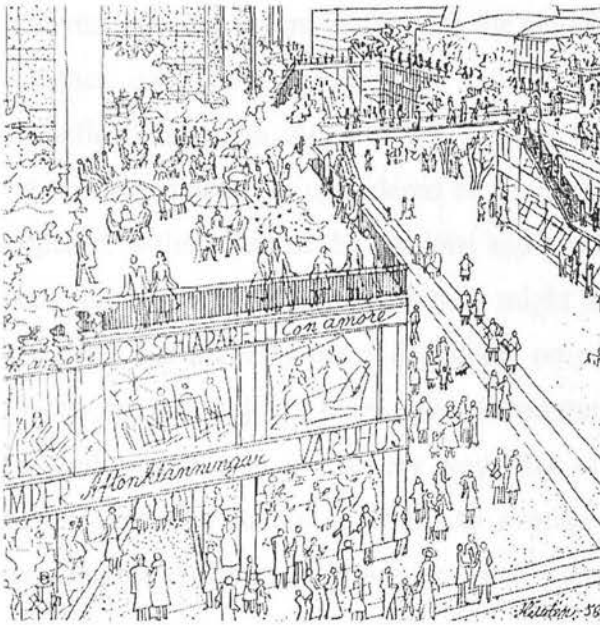
Only through responding to these social forces does a city should offer genuine public spaces, spaces, which are in the public interest and accessible to all citizens at all times. At the same time there are some semi-public spaces, created for some social groups and excluding others, caused by (and reinforcing) social and spatial segregation, although this might reflect the purpose of such spaces.

Social structure determines the social distribution of space and the evolution of urban spatial structure. Even the appearances and physical organisations of objects in public spaces - informal possibilities for sitting and relaxing - depend on the social forces, because these kinds of spaces within the city main structure are supposed to be the containers for social life. The social life gives rise to morphologies of the structure of city in its transformation process seen as a set of interest, tensions and situations whose point of reference is the social nucleus, and the structure of the city is conceived as the



spatial system which embodies it. Social relationships address the dynamism and transformation within urban spaces and the social communication.

In this regard, Tibbalds (1992) argues that the *public realm* is the most important part of our cities. It is where the greatest amount of human contact and interaction takes place. It embraces all the parts of urban fabric to which the public have physical and visual access. So to respond to all the desires of people from various groups and social classes and to satisfy them all puts great demands on the city main structure's characteristics. The characteristics must favour the attraction of a broad spectrum of population groups, so this attraction must consist of more than the supply of goods and services.



Source:  
E. Bacon, 1974

The other aspect of social forces, as Firenze (1980) suggests is found in theories emphasising social activities, in particular those aiming at flexible structures to enable a multitude of changing functions to be accommodated within the physical manifestations of the city.

It is critical that although, social organisation influences the structure of urban space but does not determine it entirely, conversely the structure of urban space influences social organisation, but does not determine it entirely. The point here is the interacting relation between all the forces affecting the final and optimum organisation of public spaces.

The underlying spatial forces and the resulting public spaces both act as open systems, which, through proposing and feed back mechanisms, constantly, satisfy, restrict,

accommodate and inspire each other (The physical confines of built space not only condition but actually create patterns of behaviour, as much as social aspirations are the generating source of the built environment).

Social behaviour results from spatial cultures, which is a consequence of coexisting urban spatial forms with a strong global social structure within the central part of city.

Chapin (1974) writes that there is an assumption that activity patterns of the metropolitan community vary with the cultural make up of the community and that they vary with the social structural context of the community and its sub-structural spheres of influence (as seen in ethnic concentrations and group identity and cohesion). Activity patterns (as a dependant variable) is the classificatory term for a variety of acts grouped together under a more generic category according to some established activity classification system. According to Chapin, a considerable range of social activities and related acts should be considered as social factors. The consequent form of the main structure is the result of the tensions and contradictions that beset the activities of civil society. The various social classes might naturally follow different or specialised activities that are very much dependant on proximity. On the other hand, people may mostly want to enjoy a heterogeneous mixture of urban amenities, and economic and cultural activities in a leisurely way. But as Durkheim (1968) states, the totality of beliefs and sentiments common to average citizens of the same society forms a determinate system, which may be called it the '*collective*' or '*common*' conscience.

The needs to establish organisations or institutions - either formal or informal - to provide desirable opportunities for social activities propound benefiting from central places in cities with easy access for all people to urban infrastructures. This is the reason of the high tendency of different institutions to occupy the territory of the city main structure - the best situation to supply the results of social activities.

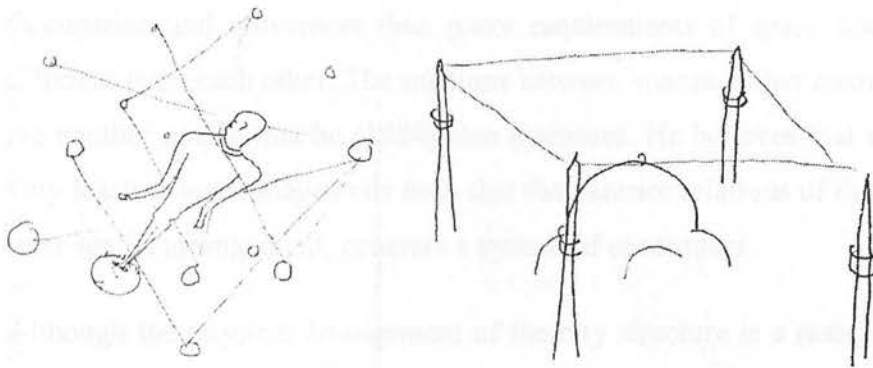
The argument is that there is a substance beyond the form, which relates the form to non-semiotic elements of its social context. Human activities and needs find these expression in forms and patterns which reflect and shape our lives; the built environment is the ultimate public statement of the intrinsic human needs to socialise.

In summary, the social force not only is a deep structural element in the formation of the city structure and the city main structure, but also the dynamism of social interaction is

an effective element in the self-regulation and, eventually, the transformation of the city main structure.

### 3-2 Spatial forces

Spatial forces are the notion of space that is lived in by people and that has genetic roots. The importance of spatial forces develops in all human beings from the concept of space, starting in the period that unborn individual spends in the womb and at that moment when the person emerges into the world, a bigger space. This is a sub-conscious awareness of space, so it is a driving force to be in a space. The concept of spatiality is inherited in the mind and it is an intrinsic need.



Source:  
E. Bacon, 1974

The concept of space is interpreted as *sense of place* in urban studies and should be considered as a human need from a psychological point of view. But a more important aspect of the need of space is based on all human activities, from primitive needs like seeking for a shelter, sleeping or resting in a house to working or spending spare time in a place, leading up to the notion of space as a fundamental force in settlements. In settlements the cycle of life depends on the chain of space, place and activity.

The way a society responds to the spatial need of various kinds of its activities, and the way organise the places in a city structure to get the maximum efficiency is based on *laws of composition* or in this case *spatial laws* regarding structuralist paradigm.

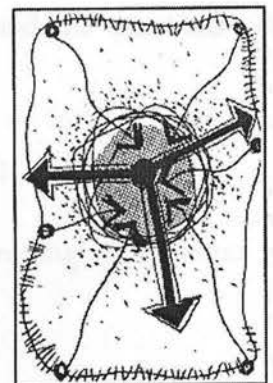
Hillier (1996) argues that *spatial laws* are a greater priority than all other forces for they are the indispensable regulators of physical expression, but the relations between the forces act as multilateral mechanism.

*The influence of spatial laws on cities is pervasive as well as deep. It effects the level at which we see and experience cities, as well as the level of their structures. If we think of cities as aggregates of cellular elements - building - linked by space, then spatial laws are the 'first filter' between their boundless morphological possibilities for such aggregates. Social and economic processes are then the second filter, guiding the basic paths of evolution to give rise to recognisable types. Specific land conditions in time and space are then the third filter through which the city acquires its eventual individuality (B. Hillier, 1996, p.339).*

An important aspect of the spatial force is in its provision of apt possibilities for all human activities to happen either in the form of occupying spaces or movement between the spaces. As Hillier (1996) argues, occupation uses the local properties of specific spaces, and movement the more global properties of the pattern of spaces. Occupation and movement then make requirements of space that are fundamentally different from each other. The relations between spaces, either open spaces or buildings, are another notion that he (1984) also discusses. He believes that a settlement is at the very least an assemblage cells such that the exterior relations of these cells, by virtue of their spatial arrangement, generate a system of encounters.

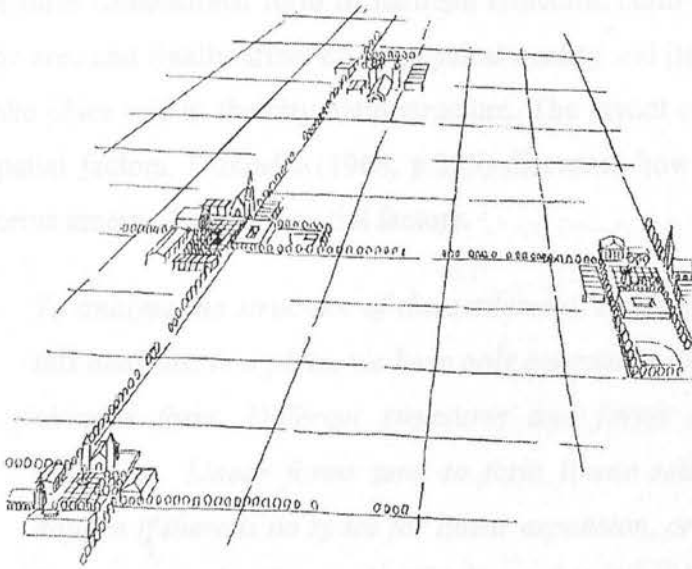
Although the physical arrangement of the city structure is a result of spatial forces the consequence of the forces goes beyond that, and affects various operations of the structure, by upholding specific patterns or juxtapositions of the activities. The process of forming the urban spaces according to the spatial needs is a dynamic process and continuously self-regulating, because a human society and its spatial requirements for activities is under constant transformation.

The law of composition governing the spatial requirement of any structure is determined by the interaction of two fundamental classes of forces: intrinsic and extrinsic forces. Intrinsic forces emerge from human needs for spaces, and the efficient as well as perceivable arrangement of those spaces and urban places. Extrinsic forces are those governing influences, which are external to any particular structure. They are largely environmental factors or pre-formed properties of a higher-level



surrounding structural system. The final interaction between those forces reflects on spatial form of the city structure and the city main structure (Tange, 1960).

Bacon (1974) refers to regional forces, which work as a system of spatial organisation in which those forces are expressed in terms of structure and could be considered as exterior forces. Topography, important routes passing through the settlement and its main structure, and accessibility are another extrinsic spatial forces while the existing built form is an intrinsic spatial force. The way in which buildings are grouped and specific objects in public spaces - focal points or landmarks with a symbolic meaning - cause a range of forces, which interfere in the capacity of public places to respond to the requirements of activities. *Hierarchy*, as a structural property in this regard, indicates the order of nodes within the structure, in which levels of accessibility and activity levels should be considered as intrinsic spatial forces.



Source:  
E.Bacon. 1974

There are other kinds of interpretations of spatial forces. Doxiadis (1968) explains a conceptual ladder in the relationship between spatial forces, and the functions and structure of settlements as:

- Forces of all kinds lead to the formation of human settlements;
- The spatial forces are the ones which give a physical meaning and a form to functions;
- Functions lead to the structure of settlements by shaping shells and networks;



- The structure of settlement leads to its form and finally;
- Texture and density are the result of the operation of spatial forces within structure and form.

He argues that the spatial forces could take various shapes. For him these kinds of forces are directional forces, which are able to direct the 'becoming process' of a settlement. Directional forces can be divided into several kinds depending on their focus; this focus can be a point or a line (a highway or a coastal line), a surface (a plain attracting agricultural production), or perhaps a volume (a cathedral which can be seen from the whole surrounding area). All these forces can be positive or negative, centripetal or centrifugal.

All these forces, by influencing on the form of a settlement and consequently on the two or three dimensional form of its main structure, confine the physical characteristics of the area and finally affect on its physical quality and its satisfaction of the activities that take place within the city main structure. The layout of urban places depends on these spatial factors. Doxiadis (1968, p.335) discusses how centralised, linear or even grid forms emerge from the spatial factors.

*To analyse the structure of the settlement, the force-mobile is the essential part of this analysis. In a plain, we have only concentric directional forces, we can expect a circular form. Different structures and forms are created by different force structures. Linear forms tend to form linear settlements. Non-linear forms may happen if there is no space for linear expansion, or if the linear functions along one line meet another line with other linear functions. Then we witness the creation of a central point. Linear forces lead to linear forms only in limited areas; beyond them they lead to a combination of linear and central forms.*

One of the primary elements of spatial force is the need of movement that influences urban form and the structure of urban grid, and through which the possibilities provided for the distribution of land uses and the assignment of development densities and system of movement are bound together. This means that under certain conditions of density and integration of the grid structure, things can happen that cannot happen elsewhere. So fixed urban elements, some unchanging large-scale things, an acropolis or river -



especially in historical cities - and the elements using for movement are working on the main structure as intrinsic spatial forces.

*Urban forms have been conceived of essentially as static objects with movement in well-specified channels. Conceptually, we separate the form itself from movement in the form. In fact, the most powerful influence shaping urban form is probably movement (B. Hillier and A. Penn, 1992, p.43-44).*

They use the term *movement economy* to indicate the importance of movements in the urban grid. This standpoint shows interacting mechanism of underlying forces - spatial and economic forces - for urban structure.

*The spatial form of the organic city is not disorderly but has a functional logic which is generated by movement more precisely, by what we call the 'movement economy' of the city, by which we mean the total relation between land-use patterns, movement of all kinds including pedestrian movement, and the structure of the urban grid. The spatial structure of the grid is the key element. 'Organic' towns, which have grown over a long period, seem to optimise certain key aspects of movement and land-use patterns by exploiting the structural properties of the urban grid (B. Hillier and A. Penn, 1992, p.41-42).*

*Laws of composition, hierarchy and centrality* are outstanding aspects of structural properties regarding spatial forces. The concept of centrality, and the highly efficient central areas within the city main structure, works as a spatial force in many cities.

The primacy of the central location in the settlement and the competition to occupy the limited central area reinforces this a kind of spatial force. The property of *homeostasis*, which in many cases has appeared is tendency to occupy the fringe of big cities could be considered as a response to the spatial force of centrality. It makes the out-of-town competition attractive, which includes ample and free parking and a bright, clean and safe shopping environment, and should be considered as a spatial force under the influence of *self-maintaining* and *transformation* process of spatial needs and space limitation in some cities. These two conflicting benefits of location and access are spatial forces in the process of spatial transformation.

To understand spatial force, what should be observed is its functional dynamics to respond to necessary mobility of the times and spaces, and seek to know how these are driven by the social and economic life of urban societies. Hillier (1999) believes that centrality is a spatial example of our need to understand the relation between structure and function in cities. An understanding of centrality is most likely to take the form of a *structure-function* model capable of showing how spatial and functional dimension are interrelated, and how both are driven by social and economic activity; the *movement economy* process is such a model.

### 3-3 Economic forces

The intrinsic needs of human beings to respond to basic requirements like shelter, food and so on, as well as secondary needs like entertainment and education, all reflect on various kinds of economic forces and form activities in a society.

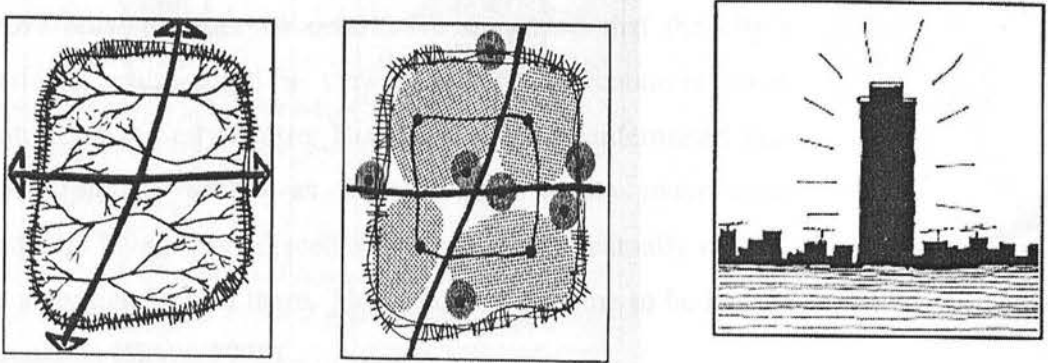
Underlying forces of economic circumstances determine many dynamic process in forming the urban structure and its major parts. The role of economic forces in the formation and transformation of the settlements is essential. As Chapman indicates:

*The economy plays a vital role in determining form. In particular, fluctuations in global and local economics have great influence on changes on urban form* (D. Chapman; 1996; p.40).

The economic forces affects on the city structure through four groups of human needs that should be responded: *consumption* either in the form of individual or social and collective use, *production* to fulfill the human needs that appear in the form of various kinds of functions, activities and services; *exchange* of products and services to meet people's requirement, *administration and institutions* to provide necessary relations between production, consumption and exchange (planning and land-use policy) (Chapman,1996).

The economic forces derive from the mechanism of interrelations between the four factors mentioned above. The centrality of the city main structure within the city structure is affected particularly by exchange and administration needs, the processes of production and the process of consumption.

Hillier (1996) states that an aspect of economy force is *movement economy*. In this regard, he discusses the net of urban grid, land-use pattern and building density as basic parameters in the urban economy, which manifest mostly in the city main structure.



*Socio-economic forces shape the city primarily through the relations between movement and the structure of the urban grid. Well functioning cities can therefore, be thought of as 'movement economies'. This means that it is the effects of space and movement on each other. The multiplier effects on both that arise from patterns of land-use and building densities, which are themselves influenced by the space-movement relation, that give cities their characteristic structures (B. Hillier, 1996, p.152).*

The land price, which is a highly significant economic factor, particularly in the central part of cities, is a consequence of interdependence of the economic and spatial forces. Urban structure is induced by urban rent beside land price, the detailed interplay of land subdivision, building density and their combined pattern of use. A dynamic relationship between activities and spatial forces is deployed across the territory of the city main structure, based on the economic forces. This aspect of the forces reflects on the self-regulating, and consequently self-maintaining, attributes of the city structure with the greatest manifestation being within the city main structure area.

Kostof (1992) states that trade was the central economic concern of cities only until the Industrial Revolution, therefore manufacturing and service activities have become increasingly important, and the nature of the business districts has changed radically. In Europe, many market towns survive little changed since their origin in the Middle Ages.

*Laws of composition* reflect on economic forces in the form of land use pattern. This structural attribute is evident the hierarchical pattern or nucleus pattern urban form and structure. The 'concentric zone' hypothesis, which was developed mainly by Burgess (1923), implicitly refers to the laws of composition that a city grows outward from its centre. He suggested that the city's spatial structure could be viewed as a set of economic zones centred on the city centre. His ideas could be interpreted that *transformation* occurs as the activities in an inner zone gradually invade the adjacent outer zone and eventually replace the activities located there. This process has come to be known as one of *invasion and succession* (Bong, 1978).



To Burgess (1923), the core of the city was the *central business district* in which the major commercial, political and social activities of the city were located. Here were the central office buildings, the cultural and civic centres, and the large department stores. According to Burgess, the concentration of the most effective activities in urban life, the high level of activities, its form in terms of building heights and floor spaces, and its dynamics are caused by the economic forces within the area, which affect on the evolving main structure.

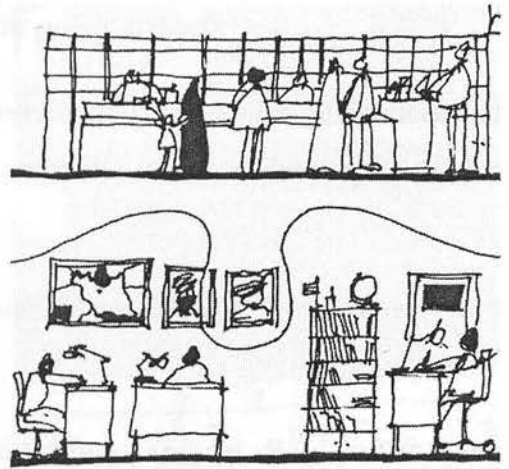
The economic forces may change the urban structure to a multi-centric structure instead the pattern suggested by Burgess. Bong (1978) defines the rise of separate nuclei in a city as attributed to some combination of four factors: that certain activities require specialised facilities and locations (greater accessibility); certain similar forms of activity often group together (agglomeration economy); many activities are unattractive to one-another. These are forces making for separation and dispersion; certain activities cannot afford high rents and seeks outskirts of the city (recreational land-use).

Regional economic theory according to Hoover and Giarratoni (1984) predicts that the forces of agglomeration and deglomeration operate to form a hierarchy of cities or places. They describe how these forces interact to restrict the number of large centres. The largest centres are surrounded by smaller places that only provide services that can exist on a small scale. The provision of a common infrastructure and public services is a major agglomerative force in urban economics. Each economic group bids for land near the city centre. Weighing the cost of land against the transport cost penalty associated

with locating outside of the city centre. This economic bidding process creates varying levels of urbanisation between cities, which may represent the structure of metropolitan areas (L. Ross, 1993).

The type of growth prevalent in central district conditions would seem to depend on the scale of demand of certain types of linked establishments that form nucleation for central locations. They form a financial nucleus, which is displaced by no other nucleus, and only, moves as a result of its own internal expansion.

Activities are the major part of the economic forces. Activities provide the greatest potential of *performance and function* attribute of the city structure. Urban places are a collection of individual activities, actions, reactions, and interactions. Thus, urban places are described in terms of what is going on in them instead of in terms of quantities of land-uses of various types. The way people actually use an urban area, their responses in choice situations, and the sequence and duration of the activities, all influence as well as derive from the economic forces. The activity patterns and the opportunities to engage in the activities depend on availability and quality of the facilities and services, which are again a part of the economic forces. Multiple-use maximises the efficiency of existing facilities by attracting different people at different times.



According to the structural property of *centrality*, in the centre, the most intensive internal and external economic forces interactions take place, and the correlation of the most important socio-economic elements is strongest. The local/global correlation in a larger central area around the core is lower than the central core, but it is still considerably higher than the purely residential quarters usually located outside the centre.

In summary, the mechanism of the economic forces on the city main structure are taken to include the following:



1. Responding to the basic and secondary needs of the society and providing the opportunity for exchanging the products and services;
2. Ensuring maximum benefits for activities;
3. Ensuring balanced supply and demand to guarantee the benefits;
4. Increasing the economic exchange advantages of high populated areas;
5. Settling the economic activities within the central parts of cities with the highest concentration;
6. providing the central location and so the best accessibility from all over the city and the most appropriate situation for supplying the goods and services;
7. From consumers point of view, the most diversity and multiplicity of services and goods and consequently more choice opportunity increase the utility of the activities;
8. Decreasing the cost of infrastructures - which is provided in city centres - as a necessity for economic activities; and
9. Getting advantages of proximity of activities, activity support chain and so more consumers' attraction, decreasing the costs of supply from one hand and increasing the benefits from the other hand.

All the factors mentioned above, put considerable pressure on the central part of the city structure's formation and transformation. The competition of advantages between private and government suppliers is another aspect of the economic forces that interacts in the limited spatial- physical forces.

### **3-4 Cultural forces**

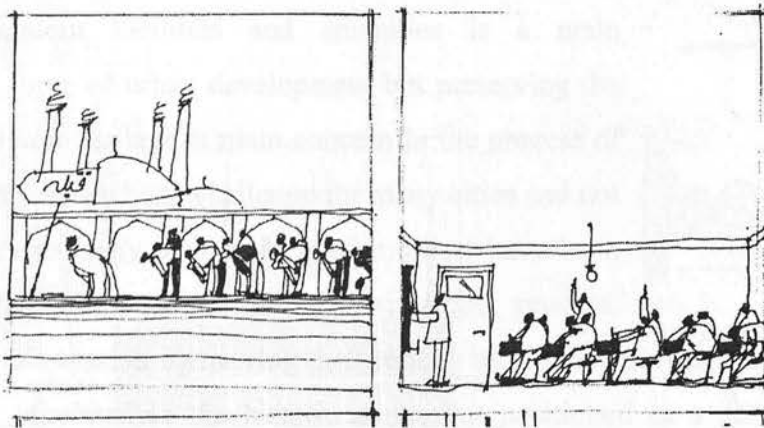
Acquiring knowledge is inherent in human being. Replying to this intrinsic human attribute in settlements should be considered as the cultural forces. Human being needs knowledge, and so starts to learn. To fulfil this force any society starts to form the foundations for building the institutes like schools and other educational organisations.



Seeking knowledge in the process of transformation is a universal law. For a settlement's transformation process, the importance of responding to cultural forces is inevitable by creating global and local organisations and related functions that ultimately interfere in quality of the deep structural properties as well as physical surface structural characteristics of the city main structure.

*Gottmann has suggested that there are several adaptive forces in society, which, influences the life and shape of urban areas: these are demographic, economic, technological and cultural forces. He considered that cultural influences are the most obvious and best-established factor, but also the most difficult to access (D. Chapman, 1996, p.37)*

An important aspect of culture with considerable impacts on city structure, especially the city main structure, belongs to religion in its many interpretations across time. Religious should be considered intrinsic in human life. Religious beliefs are the context of culture and at time have had the highest degree of influence on human civilisation, and consequently on major urban objects. In many instances religion was so predominant in the physical structure of the holy cities as to be the very essence of them.



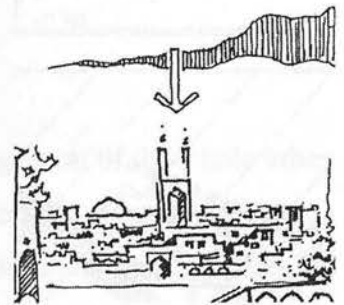
Kostof's investigations (1992) indicate that changes in the state religion have had major consequences on the urban form. The cathedral of Granada was built on the foundations of the Razed Friday Mosque. On the other side of the Atlantic Ocean during the same period, the Spaniards were also destroying the chief shine of another culture, the Aztec of Tenochetitlan, and replacing it on an adjacent site with the cathedral of the newly named Mexico City. Sometimes a church has been become a mosque (Istanbul) or vice

versa (Cordoba). But urban conversations are rarely that simple. For one thing, the hallowed precincts and rituals of some religions are place-specific and not easily interchangeable. For another, political reality or symbolism may force visible readjustments of visual accent within the urban form.

### 3-5 Historical forces

Belonging to a historical-cultural heritage is strong component of the identity of any person or society. Interpretation of national history to a place, its impact and translation, is a powerful force and drives in a society's life. The historical part of a city and its historical places are a manifestation of holism in terms of time as the fourth dimension. It is the place where all the forces that people of a particular society have been adopted and integrated. It is a mirror of transformation in a city and in particular the city main structure. Historical remains in a city are now is considered as vital cultural heritage not only for that city but also for the whole nation. The cultural and urban significance of historic urban centres is only increased by pressures on the developing process of the inner cities, so these centres should constitute static and constant urban formations.

The tension between a city trying to retain its heritage while providing modern facilities and amenities is a main considerable force of urban development but preserving the historical-cultural heritage is main concern in the process of transformation. It is a huge challenge for many cities and not many cities (like many of the old Iranian cities) have been successful in this aspect of the self-maintaining process.



Paris solves this tension by moving the pressure of the new development westwards to La Defence, unrelated to the historic cores, but positioned as a continuation of an existing Champs Elysee, the grand axis.

Noticing the historical forces is very essential because, as Lynch states (1980), sensory quality is related to the history of a place. The character of place is the results of historical evolution; and thinking of how to conserve or enhance that character is illuminated by knowing how it come to be and what historic forces still sustain it. The main philosophy in the renewal of the historic centre, according to Miller (1989), is to

preserve the unique character and to revitalise its street culture. That is, to get more people and activities back into the streets and open spaces of the historic centre.

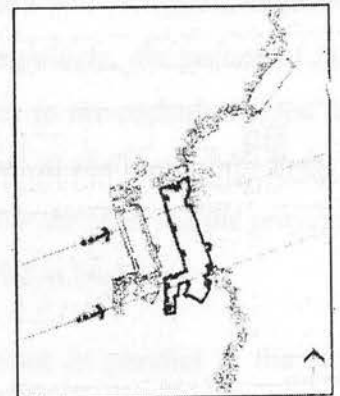
The idea of *using historical forces* belongs to a broader category of historical phenomena than the style-centred ideas of historicism, which directly counters what it sees as modernism's deliberate attempts to instillation forgetfulness of the history.

Besides the necessity of historical heritage conservation, considering the contemporary cultural activities is also inevitable. This group of activities could be categorised as: a) educational activities which it is possible to disperse across the whole urban areas; the artistic 'high-cultural' activities like museums, galleries, cinemas and theatres, which are best suited to central areas of a city; the informal socio-cultural land uses like cafés and restaurants which as a part of street culture have the general tendency to congregate in the central part without destroying the historical values of the area; sports activities, which do not need to concentrate in the central part of the urban structure; and religious activities which show both tendencies of scattering within and serving peripheral districts of a city structure and settling within the central part for the highest level of the activity - like the Jamie Mosque or Cathedral. The ease of availability for cultural activities from any mentioned category has been always a main demand of people and so is considered as a cultural underlying force for the city main structure.

### 3-6 Political forces

In this thesis the underlying political forces concern the management of the whole urban system. It is a deep structural element for the city structure because every system needs maintenance. The self-maintaining property of the city structure is innate within the urban structure. The political forces are the organisational form of that property and ideally are subject to the same drives that of the process the intrinsic transformation of the city structure.

The core concept of the political forces relates to the emergence, evolution and even deterioration of the city main structure - physically or functionally - according to the political power in any form. As the city main structure is a public area available to everybody, a kind of



capacity above the individual will or energy is needed to control and conduct the huge energy concentrated within the area. The political force is capable of using its power and policy to activate the energy in the urban system.

The political force can also mediate between the imbalanced requirements and activities of different parties in a society. It is a tool to achieve the self-regulating and self-maintaining process of the urban system in its global entity. This underlying force may be necessary to balance interactions between different forces like social and economic forces when they are in contradiction and put conflicting pressure on the urban structure.

Kostof (1992) reaches the conclusion that, within the context of culture, political change involves questions of continuity, legitimacy, balance of power and system of government.

Mechanisms that the political forces can turn to in dealing with contradictory tendencies are to affiliate itself closely to the cultural force of religious authority or to use its legislating and judiciary tools for managing the whole urban system. Consequently all the organisations related to the sophisticated mechanism are resided within the city main structure at the highest structural level within the city main structure where these work in collaboration. The studies of Kostof confirm that the political power has always tried to strengthen its legitimacy by being close to religious power. Although his discussions observe the organisations or the land uses, but its essence shows the interrelated mechanism of the forces. He writes:

*But as a rule, the city had these two poles, the civic and the religious, separate and meaningfully counterpoised. Whatever the political struggles that established their interrelationships, the two centres of a classic city, Agora and Acropolis, together defined the public realm. In western Christian cities, similarly, the palace of the king or of his authority and the palace of the bishop next to the cathedral stood as pendants, often at the opposite end of the town. In Islam, at the beginning, Friday Mosques and ruler's palace were next to one another since the ruler led the prayers, there being no separate priestly hierarchy (S. Kostof, 1992, p.84-85).*

The political force and the laws of composition should work in parallel in the city structure. By its disposition of specific rules, regulations or by supporting particular

urban plans or projects, the political force is able to follow the laws of composition. The government's decisions and actions thus greatly affect land use allocation. In the socialist city, as Kostof indicates, the control operative principle is the abolition of capitalist status. It is the government, which decides the size or lack of the public spaces and questions of zoning. After the Second World War, in the centre of many cities, the old business districts were replaced by monumental administrative/ governmental cores. A vast public space of a ceremonial nature occupies much of this central area. He also adds that the central ceremonial complex visually modelled the divine prototype, which is why temple-palace groups are often planned in a formal manner that would stand in significant contrast to the rest of the urban fabric, both in scale and in calculated order. The shape of many cities in history represents a serial growth of planned increments grafted to an original core.

*The choice of the central area, also, influenced by prestige and political links (R. L. Davis, 1983, p.245).*

Defence is another essential aspect of political forces reflecting the nature of the central part of many cities in history that grew up around earlier castles or citadels.

Recently, development agencies, as representatives of political power have come to play the major role on the city structures, and the investors in their changing programmes. Whereas complementary centres are the result of governmental intervention and are subject to the planning of the public sector; competitive centres are in the domain of the private sector.

The political forces are activated through the disposal of power of various levels, which are the decision-making organisations. The outcome of the decisions is either in the form of regulations, a control system or implemental organisations. The financial power of government provides the means to do huge projects, to buy expensive properties in central parts or to establish major infrastructure and consequently to conduct the organic process of change in the city main structure area.

Because they offer the most suitable location for memorial and ceremonial gatherings the desirability for the central areas in cities increase. Siting various administrative offices within the main structure's territory follows the objective of opening up these services to the people.



The political forces could be considered as the most essential forces on the urban structure, its characteristics and changes. They could restrict or stimulate other forces and have further indirect influences on the other forces in the decision-making process. Their tendency to locate their premises in the city centres increases the power of the political forces. But the decisions of political forces are positively effective on the city structure evolution only so as long as they are in agreement with the transformation process of the structure based on its innate self-regulating property across time. This may be the reason why major changes in government have always taken place in some cities that embrace the central seats of power.

In Iran in particular, new forms of government that wanted to be seen as radical and revolutionary frequently spurned the official site of the previous regime and built their own sovereign district, moved the royal residence to a different location in the capital or even to a new capital on many occasions throughout history.

### **3-7 Geographical, Environmental forces**

Any settlement must occupy a natural setting. A basic necessity for a settlement to form and transform is obtaining the benefits from natural resources and this is conditioned by its geographical bed. Originating and transforming the core of a settlement is restricted and given advantages by its geographical bed. This factor for a settlement is considered as a basis for the form and size of the city structure and this underlying force is a context for deep and surface structural properties to emerge.

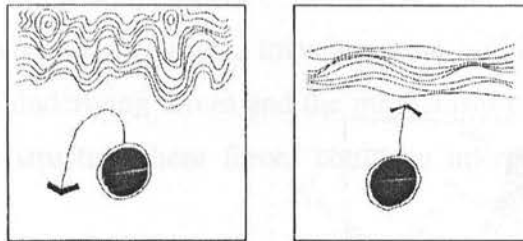
The geographical and environmental specifications could be considered as underlying the potentials for other forces to act. The earth's surface, as well as its subterranean conditions affects the life and activities of a city. The environmental situation defines its climate, topography, soil and geological conditions, and water and mineral resources. The degree of importance of any of these factors in city structure globally and on the city main structure in particular is different.

The topography of an area provides circumstances for the form and size of a city and its central area. The city acquires its eventual individuality from specific land conditions in



space. Physical characteristics basically are influenced by land features, which can even be subjectively transformed into locating landmarks for a city.

Water resources provide the potential for many activities to happen. Surface streams and natural lakes work as growth poles and the city main structures can form and expand alongside or around them in many cities.



*The locational factors have strong influence on urban growth. The natural resources present in the surrounding area and the location of and access to specific regions are key determinates of historic urban development (L. Ross, 1993, p.1112).*

*Places with specific urban identity or specific locations loose, in the process of adaptation to the needs of citizens and visitors, many normal urban functions; in extreme cases they undergo a complete formal and structural transformation as well (J. P. Blair et al., 1996, p.63).*

The natural resources - either soil or mineral - are the basic necessity of many industrial or agricultural activities, in the city main structure. The commercial activities carried out in city centre depend on these products. The economy of a city, itself an underlying force for the apparent characteristics of the city main structure, thus greatly is influenced by the natural resources.

The effects of the climatic conditions in city life could restrict outdoor activities or the moderate climate could stimulate a range of recreational activities. The secret is that nature creates forms and structures according to the requirements of minimum energy and this is unconsciously or purposefully followed by human being in settlements.

To summarise, the potentials or restrictions of the sustainability of a settlement and its main structure is conditioned by its geographical and environmental characteristics as an underlying force. Attractions and development of activities, the physical growth and the growth form basically depends on their natural forces.

The relationships between the object of the main structure are not detached from its surroundings. The environmental characteristics are the basis for the inter-linked mechanisms of other forces to be activated.

### 3-8 Conclusion

According to the structuralist paradigm, transformation within any kind of structure takes place because of underlying forces and the mechanism of how these forces work together. For the city structure these forces could be interpreted as deep structural elements.

Regarding the structuralist ideas, underlying forces are the source of transformation and of changes in structure, in this case in urban life. The forces embedded in the structure exert guiding impacts on people and public places, although it should be recognised that every structure is subject to the same set of forces.

All these forces have roots in human needs and a presence in people's mind and the city as a social context seeks to fulfil the needs behind the forces, so these forces are the origin of the city structure formation.

Underlying forces are densest in the city main structure. All kinds of transformations like cultural transformation are more evident, powerful and more effective within the city main structure. The reason is that the city main structure is the concentrated laws for cultural activities and monuments, attraction for people coming to these places and so the places of greatest interaction between them. Consequently the city main structure is the place that the power of whole underlying forces emerges.

The surface structural elements, like different places, buildings and activities are the way the society responds to the forces embedded in the city main structure. For instance, because people inherent the need of socialisation as driving force, the city main structure responds to the social need as a force which could be read from the surface structure. Social needs and transformations lead to the necessity of public areas belonging to everybody, which all social classes feel free in that area to socialise. This area is the city main structure.

The connection and interaction between the forces is the measure of the appropriateness of the urban life quality. The result is related to the social context and to people's interpretations and is different from culture to culture.

The city main structure not only fulfils social needs, it presents people with the chance to contribute to the process of transformation of a city structure to use their ideas and their activities to give quality to their city and enrich its structure.

The forces are source of a city's internal energy. The interaction of the elements increases the energy. When there is greater energy, there is more diversity, and the path from simplicity to greater complexity and consequently transformation within the city structure happens.

Some triggers for this energy are intrinsic to the city main structure and some others are extrinsic, and come from the outside environment. The energy is represented as forces inherent in the nature of things and their tendency to complexity and become more mature. This is the structuration process.

All the structural properties relate to understanding the mechanism of the interaction of underlying forces which could be deduced from the behaviour of the city as a structure and also from its surface as comprising surface structural elements.

[Underlying forces] *refer not to the surface appearances of forms but to deep structures underlying spatial configurations and their relation to living patterns* (B. Hillier, 1996, p.38).

Bourne (1982) expresses that the spatial structure observed in urban areas reflects the complex interplay of many diverse forces, some of which are internal, whereas others are external to the city, but none of which can be extracted and studied in isolation. Urban structure is firstly a spatial mirror of society and its historical and organisational principles, within which the city has developed.

In nature, the form of an object is a '*diagram*' of forces. The various forces in the city structure find their formal manifestation in urban activities and pattern of land-uses. Bourne (1978) argues that many different principles (or forces) combine to determine the spatial organisation of an urban system. The military, the church or the process of public administration each creates its own pattern of structure, flow and growth.

Structural properties of dynamism, self-maintenance and transformation are the outcome of the interaction mechanism of the forces through a sequence of thousands of events, actions and decisions. The commonest principle of the mechanism in self-maintenance is identified as the economic force of competition with its reflection on the land market, proximity of activities and occupation of central areas. The dynamics of socialisation and stratification reflect the process of social clustering, networks and organisation, and institutions are reflected in the formalised patterns and rules of behaviour.

*The development of built environments results from the interaction of a complex and diverse range of forces and actions of the multitude of individuals and agencies* (D. Chapman; 1996; p.XI).

The conflict, contradiction and consequently competition between the forces intensify the pressure on the city centre. The results would be:

- Increased land value and rent;
- High pressure on the networks (such as traffic congestion) and on infrastructural and communication facilities;
- Competition in attracting specialised labour;
- Competition in absorbing investments; and
- Competition in occupying the best arena to present goods and services.

According to structuralism, the process of *equilibrium* of the city structure leads the underlying forces to a balanced situation (*homeostasis*). The final physical and functional form is the resultant of these forces, a sum of combined existing possibilities and various needs of citizens. The ultimate nature of the mechanism is not *static* but *dynamic*, constantly changing according to the weight of any of the forces implicit in the process.

As Rossi (1982) indicates, an understanding the forces operating on the city is related to the specific way in which these forces co-operate in the process of transformation. Recognising the forces is not enough but it is necessary to know, first, how they are

applied, and second, how their application causes different changes; to realise that changes on one hand depend on the nature of the forces, and on the other, on the local situation and the type of the city in which they arise. A relationship must then be established between the city structure and the forces acting on it in order to recognise the modes of its transformation. In the modern period a significant number of these transformations can be explained on the basis of planning, inasmuch as this constitutes the physical form that these forces controlling the transformation of the city structure which have become manifested.

## Chapter Four

*Chapter Four*

## Surface Structure

## Visible Characteristic

The following discussion is about the surface structure of the city, its visible and functional characteristics. The surface structure refers to the visible characteristics of what has already mentioned as the structural properties of the city, space and planability of built system. The visible characteristics are defined as the physical identification of the city structural properties of the structure, the visible quality is the urban plan and finally by the integrable qualities, which are the visible aspect of both physical and functional characteristics.



To identify the domain of the main structure within the city it is essential to recognize different characteristics of this area. Understanding the characteristics of the main structure is important in considering its effects on the whole city life and atmosphere.

*The issue of an environment is an issue consequence that flows from its structure.*  
(Kevin Lynch, 1980, p. 78).

*Howard says the structure is important in its effects, the whole substance of the influence exists in its effect.* (Alison Smith, 1984, p. 202).



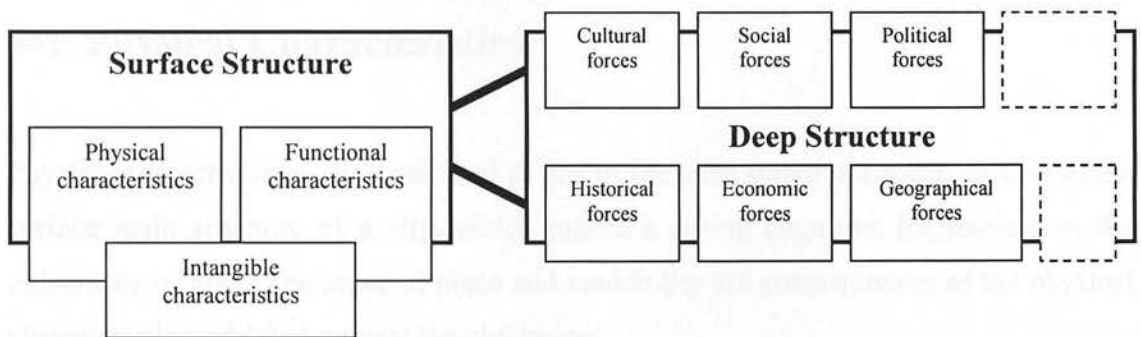
# Chapter Four

## Surface Structure

### Visible characteristics of the city main structure

#### 4-0 Introduction

The following discussions are about the surface main structure of the city, its physical and functional characteristics. The surface structure refers to the visible characteristics of what has already mentioned as the structural properties of the city structure and particularly its main structure. The visible characteristics are formed by the physical manifestation of the deep structural properties of the structure, the activities going on in the urban places and finally by the intangible qualities, which are the consequences of both physical and functional characteristics.



To identify the domain of the main structure within the city it is essential to categorise different characteristics of this area. Understanding the characteristics of the main structure is important in considering its effects on the whole city life and atmosphere.

*The sense of an environment is only one consequence that flows from its structure (Kevin Lynch, 1980,p.78).*

*Althusser says the structure is immanent in its effects; the whole existence of the structure consists in its effects (Alison Assiter, 1984,p.283).*

What gives special characteristics to the city main structure is a combination of built environment and activities that take place in this context. It is possible to classify the presence of people in two ways, as either occupying a place for any kind of activity or as moving between places. As Hillier (1996) explains, occupation means the use of space for activities, which are at least partly and often largely static. Movement is preliminarily about the relation between the spaces rather than spaces themselves. These two key classifications could help to distinguish the main structure from other parts of the city.

When particular physical and functional characteristics manifest in some urban elements, so these elements could be considered as *structural elements*. In this case the structural properties should be channelled in them and in their physical and functional and intangible characteristics. The structural properties reflect on particular visible characteristics. Amongst those mentioned structural properties, *laws of composition, order, hierarchy and centrality, dynamism* are more observable on the surface structure.

## 4-1 Physical Characteristics

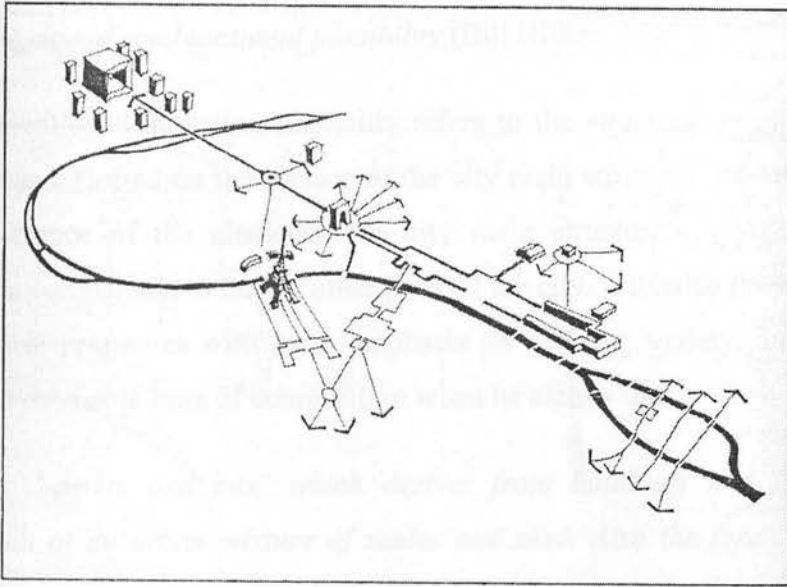
Physical characteristics are considered as one of the most important specifications of the surface main structure of a city, which makes a strong cognitive impression on the citizens or visitors. The sense of place and readability are consequences of the physical characteristics, which dominate the city image.

It is hypothesised in this research that physical and morphological properties are the most illustrative of the whole city character. Physical specifications can give clear definition to centre with visibility provides the predominance of the area of public space and facilitates its popularity. Public spaces as focal points therefore are used to demonstrate a town's civic nature, historic power and administrative or social importance.

Function, culture, movement, land-use, architecture, monumentality and many other determinants in a city need a physical conveyor to create interaction among themselves and the built environment. By recognising the differentiation of spaces in terms of size,

width and visibility, a person can identify himself or herself within the urban system and consequently within the city main structure.

The surface elements, that provide the physical character, are buildings, squares, streets, landmarks or any other features and the combination of all of these together, which form a skyline or townscape. The physical form is a three dimensional character. The pattern and size of the physical elements highly affects the physical identification and the interaction between them and the functional characteristics is considerable, and so this 'whole' formed by the visible characteristics because the 'image' of the city main structure.



For buildings, the architectural style, the size of lots, building height, material, colour and age are typical identifying features. For open and green spaces, size and the accessibility are the main criteria taken into account. For streets and squares, the movement networks, the design of the roads and their divisions, landscaping and green parts either in the middle or of the edges, the pavement size and texture are important. The services provided for the roads - like information signs, lighting, or street furniture - are properties that also affect the physical characteristics.

The physical character as a totality is the effect of the composition of the elements. The building density, the configurations of built area to open space, and the juxtaposition of these elements are key points in this case. Equally, the spirit of a space relates to the activities that take place in it (see Bacon, 1974).

Hillier (1996) regards the value of integration of spaces as their intelligibility and their *axiality* as a more general means to provide larger-scale intelligibility and spatial orientation in a system, in which intelligibility is the capacity to link the *local place* to the *global structure*.

*Two configurational roles of elements are: the laws that generate the elements themselves, and those that generate the impact of the element on the complex as a whole. It is not useful to think of global patterns as arising from relations among elements. In a spatial configuration, every local move has its configurational effect, and it is the natural laws that govern these local to global effects that govern global configuration. It is knowledge of these laws that we require for a theory of space, not knowledge of combinational possibility (Bill Hillier, 1996, p.329).*

The above-mentioned quotation implicitly refers to the structural property of *laws of composition* as reflected on the surface of the city main structure. By arrangement and internal coherence of the elements, the city main structure's visual integration is maximised in comparison to that of other parts of the city. Tibbalds (1992) refers to the same structural properties with more emphasis on contrast, variety, and hierarchy as other aspects of visible laws of composition when he claims that:

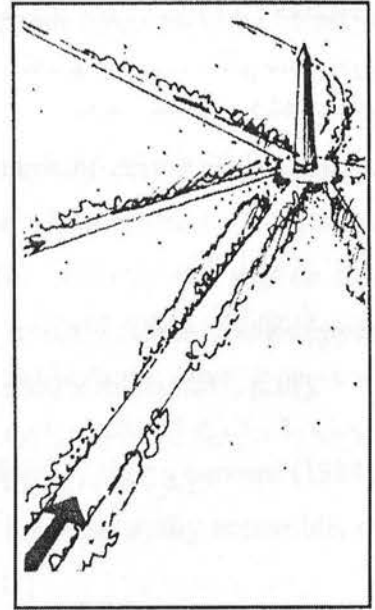
*There is 'variety and mix' which derives from buildings and land uses, and adaptation of an urban mixture of scales and uses. Also the formal and informal hierarchies and referencing systems, which relate one part of the city to another, can be mentioned. It is provided spaces and places that people remember (sense of order and unity). Closely associated with this is the accentuation of 'contrasts' (between narrow streets and larger public spaces, busy areas and quiet retreats) (F. Tibbalds, 1992, p.24).*

When the area of the city main structure is vast the visibility of the *laws of composition* and perceiving the *whole* can be complicated. Trancik (1986) indicates that in this case, the circulation and connection, become extremely important to the understanding of urban structure. Boundon (1971) suggests that these can be reinforced by the placing of landmarks or distinctive buildings, and by facilitating physical and visual linkages using memorable features. In this way the visual interest created by vistas is of concern in that it reinforces the physical character of the city main structure. The *order* of the focal

points in the physical composition thus plays a key role and provides hidden potential for the surface structure. An enhanced *order* based on a *hierarchical* pattern increases the *centrality* of the area. So the physical compositions *order*, *hierarchy* and *centrality* is considerable in expressing the structural properties of the city main structure.

Lynch's discussions on the character of the urban centre and urban scene (in Banergy *et al.*, 1990) refer to the symbolic importance of the elements of the area that these buildings act as foci for organisation and memory.

Visible character for him is combination of landform and building types which is expected to be unique for each part of the centre but the diversity between the parts derives by hidden potential of associations with pre-existing monuments or structures. The city main structure thus has the potential to embody monuments because public areas provide prime situations to locate the monuments. The consequences of the opportunity are indicated by Trancik (1986), who believes that the symbolic ceremonial function of public space is expressed in monumental formality. The advantages of monuments and public places are mutual.



*A monument must mark a place of more than private importance or interest. Monumentality is a function of the society's agreeing upon extraordinarily important places on the earth's surface, and of society's celebrating their pre-eminence* (C. Maer, 1997, p.100).

A well-integrated system of monuments with streets and squares associated with architectural details and landscaping, increase the unity and quality of the places and invites a broader range of people to experience the immediate area. Consequently add this physical richness to the social vitality of the city main structure.

Accessibility results substantially from the physical characteristics of the city structure and its main parts. It results from physical aspect of the *laws of composition* and provides an opportunity for *dynamism* within the city structure. The city main structure must be accessible from all parts of the city (Kingoriah, 1983).



The impact of the accessibility on the emergence of other structural properties could be concluded from Lunch's definition of access (1982). He explains accessibility as the ability to reach other persons' activities, resources, services, information, or places. Accessibility, therefore, influences on the structural property of urban *self-regulating*.

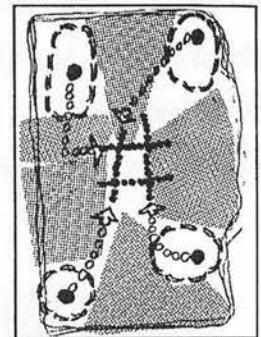
Accessibility is important for creating unity in the whole of the main structure. The accessibility either from all over the city to this area or accessibility among parts within the main structure can, in some cases, be the most significant input from the physical character of the city.

*Inter-accessibility should also be reflected in the pattern of access to the centre: whichever direction you approach the centre from; the whole centre should quickly make its inter-accessibility available and obvious. The effect of this will be that although bits of the centre grow out along these routs to some extent, it will happen in such a way as to conserve the integrity of the whole* (Bill Hillier, 1999, p.11).

A claim represented by Peponis *et al.* (1989), borrowed from Hillier's concept (1984), propounds that the *urban core* comprises the spaces that are most easily accessible, or best integrated into the urban layout as a whole.

Accessibility is also mentioned by Chapman (1996) as one of three basic qualities that underlie the health of a town centre, the two others are *attractions* and *amenity*. He nominates a fourth *quality of action* that is concerned with *making things happen* and divides accessibility into the two components of *mobility* and *linkages*.

Consequently, as *accessibility* and *location* are directly related to each other, and because the importance of certain buildings or locations arises from global physical properties of the whole city structure, the accessibility of the city main structure zone is highly dependant to the city pattern as well as on its own internal pattern which provides especial qualities of accessibility and amenity.



*Centrality* influences the accessibility and occupational diversification of a centre. Bird (1977) believes that the idea of *centrality* may be a basic psychological human need in connection with the need of the mind to comprehend the parts of the city machine

easier. It allows the person to be able to connect different parts or elements into a system of mutual accessibility.

Along with general *form* and *size*, *pattern*, is one of the city main structure's structural properties based on the *laws of composition*. The manifestation of many physical characteristics depends on combination pattern of the elements not an individual element. Pattern is a two and also three dimensional notion.

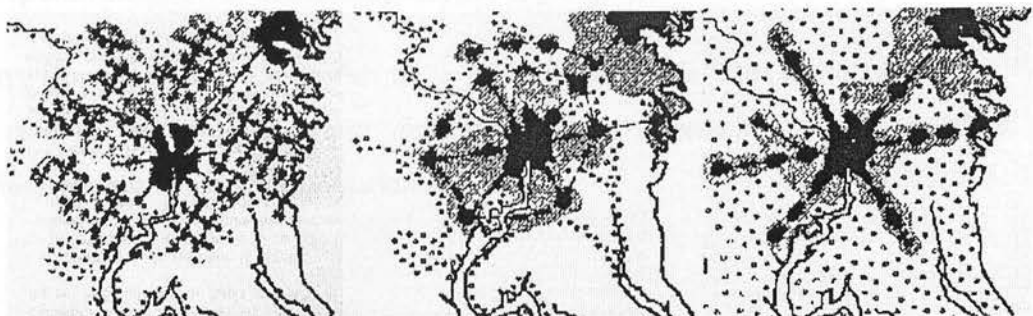
*The spatial pattern of a city is made up of the location of fixed activities as well as the patterns of circulation and physical structure* (Kevin Lynch, 1982, p.48).

Pattern is the consequence of structural elements of the *underlying forces*, responds to the geographical, socio-cultural, economic situation and might be changed over time.

*Spatial images such as rings, axes, sectors, and multiple nuclei are employed to characterise the patterns. Some urban models focus on the patterns of central place, such as centre hierarchies, multifocal or focal patterns, linear centres, neighbourhood centres, civic centres and so on* (Kevin Lynch, 1982, pp.229 & 284).

Lynch (1982) indicates that the most significant features in the pattern are focal organisation, the interrelation of the nodes, the concentration and the contrast with the background.

Some patterns describe the geographical distribution of the *hierarchical* position of the elements within the main structure, either physically or functionally. *Central place theory, the star city, the satellite concept* and *the neighbourhood idea* are all married to this hierarchical notion. These describe a hierarchy of accessibility and activity levels. This hierarchy could exist in any geographical model including “*the ranking of the nuclei in the central district according to each one's ability to displace any or all other uses*” (Bowden, 1982, p.339).



Different patterns show special advantages. A city based on a radial plan has a ready-made centrality, which could equip itself with an intra-urban hierarchy of centres. Land use pattern is obviously influenced by the physical pattern. The simplest physical patterns are more comprehensible than complicated or composite patterns, are more efficient facilitators for the structural property of wholeness.

The physical form of the city main structure derives from the specific pattern of the major surface structural elements with a focus on the three-dimensional nature.

*The global form retains a certain 'structural stability' so that we can see it and point to it in much the same way as we would see or point to an object (Hillire, 1995, p.34).*

Any urban form either global to or a part of the city, is the manifestation of an assemblage different kinds of forces. This manifestation is not only physical but also the result of all activities going on in the city. The reflection of culture, economy and other underlying forces can be followed in such a physical form highly crystallised within the main part of the city skeleton and that confers a sense of place to its hinterland. The physical form of the city main structure juxtaposes the symbols of competing, political, religious, social or economic powers, and hierarchical spatial organisation is the result. As the size of a city increases, the simple pattern might gradually adopt more complicated or composite patterns.

*Bourne defines urban form as the spatial elements include built environment, buildings and land uses, as well as social groups, economic activities and public institutions. Through interactions, these individual elements are integrated into functional entities or subsystems. The patterns of behaviour and interaction within sub systems, when overlaid on urban form and combined with a set of organisational rules that link the subsystems into a city system constitute the urban spatial structure (Ali Madanipour, 1996, p.33).*

Larry Bourne, (1982, p36) refers to “organising principle” that can be defined as “a set of rules and regulations that determine the arrangement, interrelationships, and behaviour of elements within a system”.

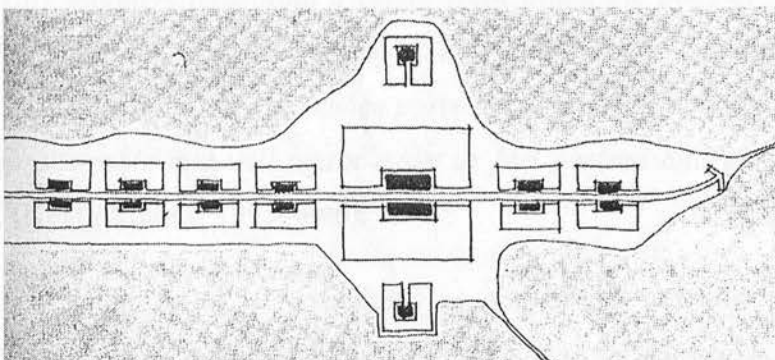
The order of the same group of elements could be presented in different patterns by various organising principles and, ultimately, physical forms.

*Order may be defined as the degree and kind of lawfulness governing the relation among the parts of an entity. Such lawfulness or obedience to controlling principles derives from the overall theme or structure, to which the behaviour of all the parts must confirm. It also applies to the makeup of each part itself. The visible shape of an object must be clearly organised if we are to recognise, remember and compare it with others (R. Arnheim, 1967).*

Spatial order in the city main structure is based on a number of carefully selected focal points and urban grid. These points are organisational. They are combined into larger systems of the city structure by means of road networks, along which subsidiary compositional elements are located in sequential series of accents.

Physical and spatial order in the cities might be achieved by using the spaces and focal points - physically, functionally or visually - through *hierarchical order*, by linking the nodes either by road networks or visually (using material peculiarities of the features like height of the landmarks). The foci, while not systemically ranked, might be systemically linked together. The notion for the large cities and metropolitan areas is the global order of the entire city. Hierarchy then becomes the principle by which the aggregation of local parts is given a globally ordered form.

The *hierarchical order* is a context or *law of composition* for the city structure. In the cities with this law of composition the city main structure follow this pattern of order from the highest level of centres to the lowest degree, which could be the neighbourhood centres.



The hierarchical order implies one dominant centre (the city main structure), including all the *highest*, most intense or most specialised activities and a number of what are essentially sub-centres, or those of lesser size, serving only a part of the community and hosting less important, intense, or specialised activities. Chapin's interpretation (1974, p.125) is that:

*Central place theory has been extended to deal with the hierarchy of centres within an urban area. There is thus a hierarchy, leading to a 'central centre' a 'downtown', a 'CBD', which has in the largest cities not one centre but several functional centres crystallised.*

Another important notion of order is the ability to provide appropriate relations between the structure and the functions, which partly emanate from the order of the elements. The proper articulation of spaces or physical elements, as well as the land uses according to the ordering principle, help people to perceive the main structure. According to the properties of the city structure, the nature of the order should be able to adapt with the process of transformation of the settlement. The results of the adaptable order are thus more durability of the city main structure because it responds to the needs of the society.

Unifying the city structure into a *whole* is a potential of physical order. The problems resulting from the loss of global order for the entire city mostly arise through loss of unity, intelligibility and sense of orientation.

*The 'bad' city is a city that is not 'whole'. To make the city 'liveable' again, it is necessary to recover a sense of order and meaning in urban form; urban regeneration must involve a more holistic, comprehensive and integrative attitude to the city. City planners must hold a centre from which the body of the city can be restored to 'legibility' and 'imagability'. The "good" city is the one we shall know again in its wholeness, the one whose parts are organised into a pattern of unity. This comprehensible city will again make us feel centred and give us a sense of plenitude (Kevin Robins, 1995, p.46).*

The hierarchical order could be considered as one of the potential patterns of restructuring the possible changes within the city structure or its *self-regulating* property.



The sources of order are mostly internal but the external forces like policies also play a significant role.

Changes in physical form and pattern are a consequence of changes in the city structure, either in its size or in the pattern of arrangement of the elements and sub-structures.

*As any structure grows in size, the proportion of its parts cannot remain constant* (L. S. Bourne, 1978, p.37).

*As the size of urban area increases, new laws of aggregation apply. Different elements appear after the first stages of urban combination, provoking a qualitative change in pattern* (E. Lozano, 1990, p.68).

The results of change in size are changes in the land use types and pattern, which is a natural and mutual relation between the physical and functional characteristics of the city main structure. This refers to the threshold of necessary population of emerging some land use as well as the combination of them. The patterns of segregation of mixed land use, or even the emergence of specialised centres or multifunctional centres, are the examples.

*Different elements appear at specific size thresholds. The level of complexity in an urban area grows much faster than its size. Complexity grows exponentially with size* (E. Lozano, 1990, p.79).

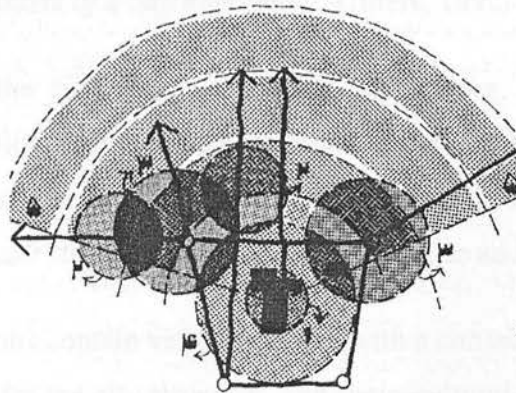
As a consequence of the physical characteristics of the surface structure, the most enduring feature of the city is reflected on its physical core, which retains its remarkable elements, gaining increments responsive to socio-economic demands and reflective of the latest styles and technology, but conserving evidence of the past urban culture. The physical characteristics related to the availability of space for working, and the socio-cultural or entertainment facilities, all help to keep a centre alive.

A city as a whole is considered as a comprehensive unit. The distinguishable physical character, its visual and spatial quality, lies in some perceivable physical properties like contrast and scale, sometimes shown as its static spaces and sometimes as the dynamic spaces created by the streets.

In sum, the physical characteristics of the city main structure could be considered to be those identifying elements of the physical environment of a city that make the most lasting impression on people's minds and have the greatest intelligibility.

## 4-2 Functional Characteristics

The functional characteristics of the city main structure refer to its urban function within entire city structure, which are the consequences of the land uses embedded in the city main structure. The citywide scale of the function, which shows the global role of the area, refers to the key importance of the functions of the area in the city life. Regarding Tange (1966), in addition to *functioning*, it is necessary to consider a process of *structuring*, the process in a city that emerges from its main structure.



An important concern is the elementary relation between structure and function. Structural function, according to structuralism, is about organising the responsibility of all vital organisations that correspond to the whole of urban life.

*There are two other concepts equally significant for structuralism. The notion of "function" is, of course, originally a biological concept. In biology one speaks about function of individual organs with respect to the whole of an organism function influences the organisation of a work and thus finds its objectification in its structure, on the other hand, function roots are in the life of society. For structuralism the concepts of function and structure are closely connected (Mukarovsky, 1978, p.80).*

The function of the main structure is like brain in a living creature. It is focus of the whole city life, even that which is not necessarily in the central location. The reason for this exemplification is the vitality of the area because of specific and sometimes unique land-uses, the high concentration of activities and people's presence within the main structure. As Bird (1977) implies, the city main structure is a place where the *centralising functions* are proclaimed in vivid three-dimensional form.

The centralising functions play role not only in daily life but also in the ceremonial and occasional gatherings with a social-cultural value. It provides opportunity for culture, entertainment, leisure, recreation, civic life and the exchange of views, ideas and opinions. The facilities provided will attract more similar, related and supporting activities and finally strengthen the central function of the city main structure.

*The city and especially the city centre provided leisure, cultural and public space and thus become the focal point of consumerism. These inner city facilities have become the major assets of a city's image* (E. Hitters, 1992, p.117).

So if an area within the city structure includes *structuring, organising, and central functions* for the urban life, it should be considered as the city main structure, because it provides *centrality* for the area. Functional characteristics of these fundamental properties of the city main structure manifest in the land use and activates.

The centralising functions contain various aspects with a consequence of reinforcing the property of wholeness for the city structure. The socio-cultural functional aspects either formal or informal of the city main structure have always been important, with the capacity of unifying the whole society as well as providing individual opportunity to socialise.

*Public spaces as 'a place to meet' have an important social and cultural function, providing the public with places to meet, rest or stop and talk. These 'optional' activities (Gehl, 1996), take place when these spaces invite the visitor to stop and interrupt more 'essential' activities such as shopping, walking or visiting* (C. Tomalin, 1998, p.34).

Gosterman (1992) considers public spaces as a unifying element where all sectors of the urban population meet where masses of people come to town every day to walk around

and enjoy the presence of other, mostly unknown people. He argues that all socio-functional qualities of public life have been used for individual pleasure, although public spaces may be designed for a socio-functional reason. Religious celebrations, for example, were traditional highlights of enjoyment and pleasure.

The *structuring and centralising functions* are interpreted regarding the composition laws. However the laws are considered as the functional pattern of the land uses and activities. Hierarchical patterns of urban functions are rooted in the composition laws. Multi or mixed-use versus specialised zones are another interpretation of the laws which basically manifest in the city centre. An important functional characteristic of the city main structure is a mix of land-uses within the zone, although a number of specialised sub-centres may appear because of the proximity of commercial activities and services. The mixed land-use pattern makes intensive use of the centre, which characterise the main structure.

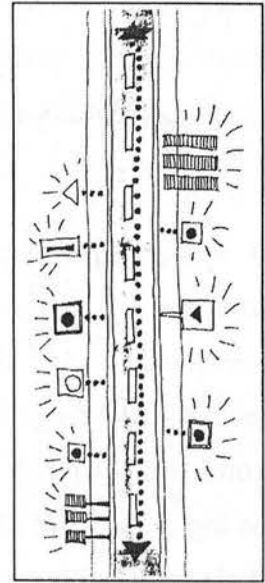
What Hillier (1996) means by the centre is some kind of multi-use network where people come for different reasons, especially, but not exclusively, retail, and somehow the different uses support each other to create a sense of composite urbanity, over and above the various components. It seems to Klerk *et al.*, (1992) that areas that are specialised in activities are still very dependant on proximity. People want to enjoy a heterogeneous mixture of urban amenities in a leisurely way, and commercial and cultural activities aim to surprise the occasional passer-by into taking an interest.

Davis (1983) refers to *part-centres* to show that highly specialised service functions have a tendency to locate close to and compete with each other, but they also supplement each other to obtain more attraction than if they were located further apart. The area thereby develops its identity.

The functional characteristics of the city main structure are the outcome of a collection of different land-uses. Gruen (1973) classifies the central functions in various centres. These centres are:

- *Civic Centres*: conglomerations of governmental offices;
- *Financial Centre*: agglomerations of banks, stockbrokers and stock markets;

- *Cultural Centres*: concentration of museums, galleries, exhibition halls, mainly located in splendid isolation from those who might want to participate in culture;
- *Centres for the Performing Arts*: concentrations of theatres, opera houses and concert halls on one isolated land area;
- *Educational Centres*: whether high school or university campuses; and
- *Office Centres*: where offices of corporations are concentrated.



There are various ideas about the dominant function of the main structure. Between them administration, commercial and entertainment are mentioned more than others. Spreiregen (1965) mentions that the centre is likely to become more of an administration centre than a centre of various services. Davis (1983) refers to highly intense concentrations of economic activity. Papageorgious (1971) writes that the historic centres have been used for administrative and commercial purposes within the traditional urban cluster, and Kostof (1992) on the specialised partitions of administrative districts and districts for business and commerce.

Hierarchical patterns of urban functions within the city structure cause the city main structure to emerge. According to this pattern the citywide activities emerge in the city main structure so it presumes a global function. This is either for a central mixed-use pattern or for specialised centres arranged through a zoning pattern. In some cases the highest level of centres have a national international function in comparison to the realm of lower level centres - district or neighbourhood - which serve a limited area and have a local function. Stone (1978) believes that the larger the centre, the greater the variety of services it can provide.

The functional pattern is closely related to the physical distribution pattern of the city nodes. The network of the nodes can take a functional hierarchical according to the physical divisions.



One of the prerequisites for the creation of a multifunctional centre is an intensive usage of land. Mono-functional centres or a polifunctional pattern in the form of several nuclei within a centre are different from a mixed land-use pattern. Polifunctional pattern is a pattern of specialised sub-centres combined in a main centre.

The zoning pattern of function within the city main structure might follow the movement network. The main axis branching from an original centre, which can attract mixed land use, may be a kind of specialised axis according to the domain land use on that part of the nucleus. This could be considered as a kind of aggregation between mixed and specialised land use. Another functional pattern of this physical form is mixed land use pattern in the form of scale of land-uses. Any of the branches might be a junction of global scale activities within the main part of the centre and local scale in the branches leading the public land uses to the heart of the neighbourhood. Taking away from the central part, the nature of city-wide functions changes, gradually replacing the local functions. Although some of its sub-functions change through urban history, the nature of central function of the city main structure remains important.

The structural property of *dynamism* of the city main structure is highly dependent on functional pattern and accessibility, which have a mutual relationship. Intensity in activities within main structure corresponds to a high level of access. The more mixed land-uses call for more demand for movements towards the area. Goddard (1982) believes that the continuing interconnection between functional linkages, location and movement patterns within the city centre cannot be denied. Duren (1992) argues that, for a substantial number of central functions, the core of the city was originally considered as the *location par excellence* because this was the optimally accessible place for visitors from the vicinity.

*This zone has the highest accessibility from all parts of city and there is great competition for all land users to locate there in order to gain advantages of this accessibility (G. R. Kingoriah, 1983, p.146).*

Functional characteristics are consequence of the nature, variety, combination pattern and frequency of land-uses. Through these factors, one or some of the land uses obtain priority over others. The variety of land-uses might be different from one city to another

depending on cultural, social or economic, specifications. In spite of these differences, some general land-uses are associated with most - if not all - major core of the cities.

Many activities take place in public places without allocated spaces, which are happening continuously or occasionally in the area, like informal exhibitions or events. Tange refers to them in his Plan of Tokyo as *collective scale* versus *individual scale* of urban activities.

Hillier (1999, pp. 2-3) indicates a very important notion in the importance of juxtapositions and interrelations of functional and physical elements which are manifestations of the laws of composition. He propounds the terms *live centrality* and *movement economy*.

*'Live centrality' means the elements of centrality, which are led by retail, markets, catering and entertainment, and other activities, which benefit unusually from movement. The argument is confined to the live centre because the spatial processes governing live centrality appear to invoke spatial requirements over and above those retained to other central functions such as administration, office employment or religion. The key proposal is that a distinctive spatial component is always present in live centres in locations favoured by and influenced by the 'movement economy' process. Both spatial and functional aspects of centrality, is concentrations of urban function that have grown up around the historic high street or market square. Typically the centre would be marked by a focal 'live centre' of markets and retail, with quieter zone of administration, business and religion in close spatial proximity defining the limits of the central area.*

He confirms (1999) that the movement economy is the process by which centrality in general is created, and that its effects should be detectable in consistent relations between the functional variables by which centrality (land-use mixes and concentration, demographic factors and so on) and distinctive types of spatial patterning are marked. For him the key questions are finding distinctive types of spatial pattern, which could functionally define centres, and their relations with the global settlement form.

As mentioned before, the major indicator of the main structure is its publicness. The specification of the public activities is that it is possible for all people to make use of them if they so wish, so that all can experience them.

*Main structure must be considered as the everyday environment experienced in the whole range of daily action* (K. Lynch, 1980, p.4).

As a conclusion, the functional character of the city main structure derives from the fact that it is a public place, the common ground where people carry out the functional and ritual activities either in the normal routine of daily life or in periodic festivities (Carretal, 1992, XI). For Walzer (1986) public space is the space for politics, religions, commerce, peaceful coexistence and impersonal encounters. The functional character of public spaces expresses and also conditions essential aspect of public life, civic culture, and everyday discourse. So the city's public spaces have an important social and cultural function.

The essence of functional characteristics of the main structure according to Luchinger (1977) could be expressed as *core functions*, providing opportunities for spontaneous manifestations of social life. The core must express a human and geographical focus.

The central part of city structure includes both *optional activities* (Gehl, 1996), as well as *essential activities* that offer a mixture of uses and a variety of activities and experiences (Tomalin, 1998). Its mixture of activities takes place either at the street level or in different levels of buildings, but of those the street-level uses are very important in defining public character of the city main structure. The major functional character of the main structure is in forming a dense concentration of people, for whatever purpose they might be there. A long history of daily or periodical use of the spaces is a result of the functional character of the area.

The functional character of the city main structure reflects the major function of a city on one hand and, on the other hand and by its citywide activities, responds to the basic necessities of city life and plays a fundamental role in civic life and civic services.

### 4-3 The Intangible Characteristics

There are characteristics of the city main structure that are consequences of the structural properties of the city structure and emerge as a result of the combined functional and physical factors. These intangible characteristics increase the strength of

recognised elements or parts of the city main structure and help people to develop an alternative cognition of the main structure related to its comprehensive visibility. The following discussions refer to some aspects of the characteristics.

#### **4-3-1 Durability**

Durability might be considered as one of the intangible characteristics of the city main structure. Lynch (1982) believes that durability must be considered as a matter of its performance. Durability is the degree to which the physical elements retain their ability to function over long periods.

The importance of durability between the characters of the city main structure arises from collective memory. The greater the durability, the greater the elements endure in the memory of citizens and so are of higher common concern and interest.

Rossi (1982) argues that some elements in the city tend to be more permanent or persistent. Persistence is revealed through *monuments*, the physical signs of the past, as well as through the persistence of the city's basic layout and plans.

Durability establishes fixed points throughout the central areas of the city. According to Alison and Peter Smithson (1968), just as mental process needs fixed points, in the sense that they are only changed over relatively long periods, to enable a person to classify and value more transient information, so the city needs identifying points by which more changeable things can be evaluated. Inter-association of the major elements of the main structure reinforces the importance of the area and increases the possibility of persistence functionally and/or physically.

#### **4-3-2 Identity**

Identity is related to the notion of durability. Physical persistence over time, uniqueness and distinctiveness, locational stability and enduring functions all take part in reinforcing identity within the especial areas in a city, like that of the city main structure, that establish identity, reside symbols of community status and the collective life to which a citizen belongs, because the public body shares similar foci of identification within the whole city structure.

Lynch (1980) believes that there is a set of places whose identity concerns almost everyone. This is the true public domain: spaces that are explicitly accessible to the general public and frequently used by them; the main streets, the great parks, squares,

halls and department stores. For Lynch (1982), the simplest form of *identity* is a *sense of place*, recalling or recognising a place as being distinct from other places. He testifies that identity and structure allow us to recognise and pattern spaces. In an earlier text (1976), he uses the comprehensive term *place character*, which lends a sense of identity, security, pleasure and understanding to a landscape.

The special characteristics of the city main structure, which makes it distinguishable from other parts of the city, might be considered as a source of urban identity. Firenze (1980) notes that the urban identity relies on the recognition of the uniqueness of urban space, characteristics that make it distinct from the other parts. The urban identity is more recognisable in those places that were formed in certain periods of the city's history in which its social and cultural life was at its most intense.

Identity, Koolhaas (1998) writes, is linked to a centre. Moreover, identity does not consist solely of the past, but is built day by day with shared public places and collective values and interests crystallised in a main structure area that enables everybody to relate to a social and cultural totality. The city main structure embodies visual reminders and physical objects or activities, which are expressions of identity. The area reflects social and functional importance of the visual expression of an identity, status and self-image valued by users and the community.

### 4-3-3 Orientation

Orientation is a quality with urban structure and urban spaces. Orientation is described by Banerjee *et al.* (1990) as the sense of clear relations for the observer to the city and its parts. The ways this self-location might be achieved implicitly refer to the main elements of the city structure such as main axes, landmarks and significant sites. The city main structure consists of the maximum number of distinguishable elements and focal points so, is the most important source of orientation within the whole city structure. The city main structure as an entity could itself be considered a focal point.

### 4-3-4 Vitality

Many explanations and descriptions of the city centre emphasise the quality of vitality for the area. Lynch (1982) defines vitality as the degree to which the form of settlement supports the vital functions. The city main structure is dense with various activities and people, hence the high concentration of energy in the area gives it a heightened vitality.



One source of vitality is variety in activities and spatial forms. Focal points and landmarks can help satisfying the aim of achieving diversity and variety. Different activities also attract diverse people to the main structure. Chapman (1996) believes that such variety can be supported or stimulated by certain places and activities, random or organised, conflicting or supporting, are all a response to the attraction of a place.

#### 4-3-5 Sense of place

Sense of place is a significant quality particularly for public places. It is defined by Lynch (1982) as the degree to which a settlement can be clearly perceived and mentally differentiated and structured in time and space by its residents, and the degree to which the mental structure connects with their values and concepts.

Rossi's discussion on the architecture of the city (1982) includes two important notions: *locus*, and *collective memory*. Locus is the relationship between a certain specific location and the buildings that are in it, where the plurality of urban artefacts ends and their singularity starts. This idea is complemented by a belief in the collective nature of human psychology, thus defining the city itself as the collective memory of its people.

As Kennedy (1974) argues, the sense of place seems to be determined by sociability, by the kind of space that is generated by movement and maximising human contacts through a dynamic relationship between social activities and physical devices. In this understanding, the physical spatial structure tends to be considered as complementary, not governing the functional structure of the city.

In order to introduce a *sense of place*, all public spaces in cities communicate functionally, symbolically or by persuasive message. Thus objects in public space symbolically communicate the meaning of place (Trancik, 1986).

#### 4-3-6 Visibility, readability, imageability

The process of perception, cognition and image of a city and its structure could be interpreted in terms of visibility, legibility, intelligibility, readability and imageability, which reveals a sequential relationship between the implied meanings of the process. The focus in here is on the role of the city main structure in the process.

Lynch (1960) discussing on *image of the city* presents an interpretation of *legibility* as the mental picture of the city held by the users. *Imageability* refers to user perception in motion and how people experience the spaces of the city guided by the five elements of:

path, edges, districts, nodes and landmarks. Lynch pays attention to visibility and movement, two factors, which give meaning to the spatial structure of the city. To Lynch (1980), the mental images that people hold of their life space are the key to understanding the sense of place.

Hillier (1996) relates *intelligibility* with *integration*. For him the property of intelligibility means the degree to which the spaces can be seen to make up the system, into which they are integrated as a whole. Intelligibility directly relates to functional and physical characteristics. Between the physical characteristics, Hillier indicates axiality and urban grid as important character to provide intelligibility for a city.

*Between structure and function is the notion of intelligibility, defined as a degree which what can be seen and experienced locally in the system allows the large-scale system to be learnt without conscious effort. Structure, intelligibility and function permit us to see the town as a social process, and the fundamental element in all three is the linear spatial elements or axis (B. Hillier, 1996, p.215).*

*Axiality is used, as the general means to provide larger-scale intelligibility and spatial orientation in a system (Ibid. p. 227).*

As a summary, the intangible characteristics of the city main structure is a result of its being a continuous entity building on the collective memory, with its unique location, physical form, specific land uses within an imaginary structure of the city and then linked these images through a memory walk from place to place. These mental images form the memory of each city and create a formal unity out of its parts, so the role of the city main structure and its central function in unifying image of the city should be recognised as essential in maintaining the whole city structure and the urban life.

## 4-4 Conclusion

The visible characteristics of the city structure and its main structure are the mirror of surface structure properties. Visible characteristics are the result of the combination of physical and functional characteristics of the surface structure of a city. The most observable structural properties on the surface structure are: *laws of composition, order,*

*hierarchy and centrality, dynamism* out of the urban activities and *self-maintenance* as physical aspect of transformation.

Physical composition, or the whole configuration of the surface structure of the city, is displayed by specific characteristics such as concentration, differentiation, hierarchy, contrast, intelligibility, crowdedness, spatial organisation, physical urban forms, configurations of urban elements and urban activities.

The intensity of the deep structure is reflected in the intensity of its surface structure. Hence, regarding visible characteristics, the city main structure is more crystallised than the rest of the city structure, and denser and more varied than the sub-ordinated parts. Many different buildings and activities are concentrated there because of the power of centrality and intensity of the central areas.

The visible manifestation of the city main structure is closely related to the natural process of centrality. The idea of a centre involves a comparison between places, and a recognition of contrast among their properties. The definition of a special place is distinguished from, and separated out of, the generality of space around it. This makes it possible to recognise specific characteristics for the core zone to distinguish it from other parts of a city structure. These could be classified as:

- The greatest concentration of integrated activities, population and traffic;
- Condensed buildings and urban texture, infrastructure, services and wealth;
- Maximum public accessibility;
- The highest presentation of various political, social, cultural, economic etc. forces;
- Durability or historical persistence; and
- The city-wide, regional or national scale (or covered areas) of land-uses;

All these characteristics are visible manifestations of responding to the structural attributes and the system of the city structure itself. The physical manifestation of a system is thus like the skeleton of an organism, in comparison to the mind, within is analogous to its deep structure.

The physical characteristics are the consequence of decisions taken at any moment in the life of the city to respond to particular situations.

As the city main structure is the locus of maximum concentration, which tends to extend its influence throughout the city structure and the various parts of the city, it is reasonable to consider the area as the *organisational core*, the basic spatial point of reference. Concentrations of energy and activity produce a sense of '*being in the centre*'.

Functional characteristics regarding the structural properties are *structuring*, *organising* and *centralising functions*. These have great impacts on the process of structural transformation, so if an area within the city structure includes *structuring*, and *centralising functions* for the urban life, it should be considered as the city main structure, because it provides *centrality* for the area. The *structuring* and *centralising functions* are interoperations of regarding the laws of composition, the hierarchical pattern of functional and the land-uses and activities.

Spatial classification adopts a more intense use of space, where a mixture of uses overlaps, this phenomenon diminishes away from the urban core to the suburbs, where single use is a predominant feature.

Functional characteristics of the surface structure are generated by maximising movement and human contacts through a dynamic relationship between social activities and physical devices. This potential is most effectively provided by the city main structure and is driven by the social and economic life of urban societies.

Structural dynamism is very important in the case of surface or visible characteristics. These characteristics are able to provide situations or facilities and so support energy that encourages people to act and grow within the urban system. Concentrations of urban functions have mostly grown up around the historic sites, turning them into the *focal live centres*. So the *dynamism* property of the city structure is very much a result of the functional characteristics.

The presence of social functions and a richness of human activity reflect the familiarity of the city main structure. This area is a part of the common awareness of nearly all the citizens. The consequence is, as Hanson (1989) mentions, both a sense of identity and a

grasp of the relation between the parts and the whole and, as Rossi (1982) says, *the collective memory of the city* arises from this area. This results from the awareness that the main structure is unique, central, stable and dynamic by itself.

An individual's ability to recognise all the functional and physical elements of the city main structure and link them together determines the degree to which one can produce a recognisable image of an urban area. Obviously, *the city of the mind* depends on the amount of information that one has been able to collect about the urban area, particularly its linear, nodal, and district type elements, and also how well these link together into some coherent pattern. The distinguishable characteristics of the main structure elements help people to recognise the central parts of the city and thus to orient themselves in a city structure. The idea of a centre involves a comparison between places. The contrast of properties between the main elements of the city centre and other parts of the city, which produces spatial variety and spatial ordering, could also provide identity for city and consequently for its citizens.

The major structural properties, which are composition law, order and hierarchy, have a lot of influence on the unified morphology and the physical and functional configuration of the city. From the unity and holism point of view, people get sense of unity because they are unified with this phenomenon.

The relationship between various urban areas, gives another review to urban structure, in which spines and nodes in urban patterns are the primary elements. Investigating in meaning and behaviour in urban space starts by looking at how these interact with structural dimensions of the city's physical and social space.

The city main structure is accommodation of all underlying forces and its visible characteristics are translation of the forces into physical elements and activities. Translation of the forces into the surface structure and physical-functional manifestation should be considered as a part of process of transformation in the city structure.

Where the characteristics like durability and historical importance, citywide or even regional and national functions with outstanding appearance concentrate, the area obtain specific role in the city life. The area starts to be the focal point of attentions and centre of activities. Urban centres are dynamic live entities, and they are centres of producing energy, wealth, and attraction. The role of the city main structure in urban life is the



logical result of its functional characteristics supported with its physical properties, which specify it from other parts of the city structure.

## Chapter Five

# Structural Transformations

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# **Chapter Five**

## **Structural Transformation**

### **5-0 Introduction**

According to structuralism, a structure is a system of transformation. It embeds concept of time and the transformation, that occur through time are defining factors of the structure. In the context of this thesis, however, a city structure is a system of transformation, meaning its tendency to move from a simple to a more complex structure. This chapter focuses on the nature of structural transformation within the hypothesis that a city is a structure.

Structural transformation is the major property of the city structure. The main source of transformation in cities is its city main structure. The city main structure is responsible for growth, development, and finally, transformation of a city. Its impacts on the evolutions of the whole city, on transformation of pattern and variety of land-uses, the physical growth, and its impacts on urban development are under consideration in this chapter.

Cities change dramatically or gradually, assuming many different kinds of change. Physical growth, socio-economic development and urban evolution are all varieties of such changes, each with its own meaning and variously based on different factors either physical or non-physical. Many factors like system information, economy, and technology play role in the changes. If a city relies on indigenous knowledge, technology, cultural values and tradition, these changes could be considered as transformations for all the energies that drive them emerge from within the city and its society, i.e. from its own structure. Many things can happen in a city, that are changes not transformation. These are caused by process that are not inherent in the city structure and will weaken it.

In the process of transformation, the city structure and the city centre respond to the changing needs of the society. The first target of waves of new demands for change has

mostly been the city centre, making this area the true mirror of the process of transformation of a city. A better understanding of urban evolution can be gained through studying the structural transformations in a city and its main structure, and thus the rules of the city structure.

## 5.1 General Concepts

The views on the process of changes in a city and its main structure include various interpretations. The general term mostly used is *change*. The other terms are *growth*, *evolution*, *development* and *transformation*. The meaning of these terms for urban concept is derived from its common meaning.

### 5-1-1 Change

The general meaning of the word *change* in the Oxford Advanced Dictionary (1995; p.184) is defined as: “*To become something different, to pass or make something pass from one form to another, to replace something with another*”. The word consists of process, arising from the *interaction of elements* that organises the *relation between elements*.

The meaning of change covers various range, from change with physical manifest to changes in activities or even economical or social-cultural characteristics. City systems and their elements can change through cultural and educative process. It is this form of change that is significant. It can, of course, imply direction, as though it is a product of conscious thought (Larkham; 1999).

Human settlements are continually changing (Lang; 1994). The physical interpretation is the most perceivable form of the changes. Kostof (1992) reaches the conclusion that in cities, only change endures, that all cities are caught in a balancing act between destruction and preservation.

The scale of change either physical or functional varies from a single element to the scale of the global form of the city. The pattern and speed of change is also different based on the underlying forces that drive it. Karimi (1998) writes that cities are always

involved in a continuous process of change; changes in social and economic patterns of urban activities, as well as changes in their physical form. Bell (1972) identifies some primary characteristics that indicate various interpretations of *change* in urban studies as: changes in the economy, changes in social structure, changes from the practical to the theoretical and change in the control of technology.

The changes could be organic or planned. There is a necessity for change in cities, as Lang (1994) claims, for, inevitably, changes in the public realm create new opportunities and new problems resulting in the need for future changes. The cycle is endless.

There are different philosophical understandings of change in urban life. The most interesting one, which is very close to the ideas of structuralism, is *metabolism* (Maki, Kawazoe). This philosophy bases its interpretation from the starting point of natural process of change. Changability and flexibility are the key elements that the metabolists seize upon and explore. Metabolism is a biological process by which life is maintained through the continuous cycle of producing and destroying protoplasm (raw materials). It means the creation of a dynamic environment that could live and grow by discarding its outdated parts and regenerating newer, more viable elements. The idea of metabolism in urban terms, according to Kawazoe (Ross, 1978), is to develop a system that can cope with the problems of its rapidly changing society, and at the same time maintain stable human lives. Ross (1978) eventually develops into the term metabolism the concept of *metamorphosis*, which is concerned with changes in physical forms and structure of the cities that could respond to the needs of a dynamic society.

In talking about metamorphosis, the group of metabolists focus on changes in the physical form utilising technology to realise their visions. Maki (Ross, 1978), however is less concerned with high technology and more concerned with space and the relationship of solid and void. He considers how people might react to an urban environment, how multipolar centres in the city have the ability to establish connections with other centres (*Ibid.* p.31).

Metabolism compares building and cities to an energetic process, its cycles of change, being the constant renewal and destruction of tissue. By clearly separating parts of a building or a city, which have different rates of change, metabolists allow certain



structure to remain undisturbed when others wear out. Metabolists' ideas are to design a city so flexible in its connections that its parts could grow, transform themselves and die while the whole continues living.

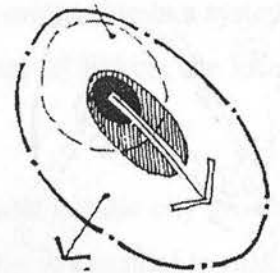
### 5-1-2 Growth

The term *growth* in the field of urban studies refers to physical change, specifically increase in size and, by necessity it means change of form as well (Doxiadis, 1968). Cities that continue to grow, unchecked could end up dwelling far from their original framework. As the total city increases in size, the centre must also evolve (Bird, 1977). Lazano (1990) indicates that while growth might be manifested in physical growth, it could also reflect increases in urban activity without immediate physical manifestation.

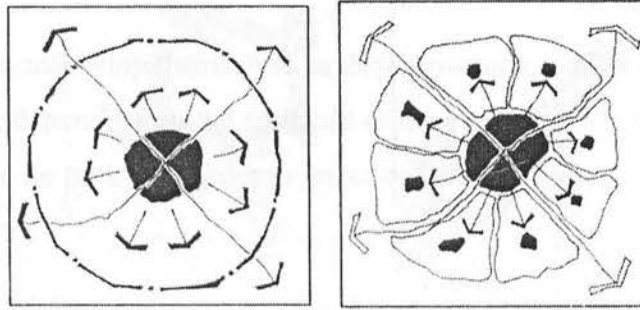
Processes of urban growth and change for Hillier (1996) seem to exhibit *emergence*, by which unforeseen macro changes result from a series of micro changes, and the contrary effect, by which macro changes produce unforeseen effects at the micro scale. He states (1984) that the spatial system must increase the amount of description in the system as it grows - that is, it must insure that the spatial aggregate has some global, as well as a local structure. So the system could be considered as a local-to-global phenomenon operating in tandem with a global-to-local system.

Growth and decline are intrinsic features of urban form (Lynch, 1982). Urban growth has phases of acceleration, deceleration and standstill. With the process of growth of a city the form may change to respond to the needs of the citizens. As Kostof (1991) claims, a city, however perfect its initial shape, is never complete, never at rest.

There are various physical types of city growth. Bowden (1982) finds that there can be different types of peripheral accretion to large central districts that have different patterns of internal growth. One example is a steady, if somewhat irregular, small-scale accretion following localised lateral expansion within the central district. Transformation or changeover of blocks from non-central business activities or with infilling of the axial extensions was concerned. Another type of growth and accretion is the burst, in which the central business district expands rapidly in a very short time. The other type of growth is



separation, in which the central district breaks up into at least two discrete parts to become a ploy-nuclear central district.



The nature of growth of places is not the same. Trancik (1986) refers to Krier's analysis of a city that had dramatically changed in recent decades, which he represents as a mechanistic unnatural form of growth. The urban centre had over-expanded in a vertical direction (high rise, high density development) and the urban periphery had over-expanded in a horizontal direction. Trancik designates this an *anti-city*, comprised of zones which segregate urban activities leaving mono-functional groupings of housing, commerce, industry, services, civic administration and cultural activities. This was a mechanical fragmentation of urban functions, which were previously organically integrated. The second form of urban growth, one which Krier endorses is introduced by Thompson (1998) as organic, based on urbanisation via the duplication of semi-autonomous urban quarters.

Hillier's (1984) interpretation of growth, although it recognises physical aspects, considers it as a spatial force within the urban system as an entity. He believes that settlement spaces tend to grow by accumulating spaces into one continuous system. The central space process is the process of adding cells to a central space defined between the initial pair of the elementary generator. He also adds (1996) that axuality is used, as the general means to ensure larger-scale intelligibility and spatial orientation in a system that would otherwise grow rather freely growing. It is the means of linking the local place to the global structure.

Stability is a very important notion in the process of growth. When a static city grows, the inside relationships are unstable. A certain level of instability is essential to make the city dynamic. When a city structure is dynamic and has an open-ended growth edge, the city can grow without internal pressure. As a city is a complex entity embracing

unrestricted numbers of social interchanges, urban growth can either change the balance or be a constant source of conflict, or it can have the effect of expanding the city outwards without interfering with the existing internal balance of relationships.

Some cities have to redevelop themselves as they grow, and others continually add to an open growth edge, depending on the structure of the city. The structure can be static, in which case it has to be broken in order to grow, or it can be dynamic, permitting growth without obsolescence.

### 5-1-3 Evolution

Evolution is defined as the gradual development of the characteristics of plant and animals over many generations, esp. the development of more complicated forms from earlier, simpler forms, the process of gradual development (Oxford Advanced Dictionary, 1995). Urban evolution could thus be regarded as any kind of change, physical growth, deterioration or development that achieves increasing complexity in the urban system.

Regarding the basic definition of evolution, it is a process that involves time, and is revealed through various phases of development. Gould (1972) suggest that organic evolution consists of extremely minor changes, followed by short bursts of extremely rapid change. Other modes of evolution -including gradual transformation- could still occur, but *punctuated equilibrium* is the predominant mode and temporal nature of evolutionary change (Gould, 1972). *Gradualist versus catastrophist* change might be applicable both to the Eldridge and Gould notion of evolution punctuated equilibrium, and to urban morphological views of change (Larkham, 1992, 1995). One of the key advantages of this interpretation of evolution is the removal of a pre-conceived notion of *progress*. Change occurs, but not towards some temporally remote goal. Vance (1990) uses this to make distinction between evolution, revolution, changes, suggesting that the latter process seeks to drive a city, through its changes, to meet some predetermined, ideal fortune state. Hillier *et al.* (1972-3) states structures of living organisms retain their stable forms and in doing so, participate in a gradual evolution.

Evolution theory and structuralism are intimately connected through the concept of transformation. *Cumulative learning systems*, to borrow the term from Dunn (1986),

implies that systems have internal self-regulating mechanism that dictate their form and evolution, and that they learn from past experience and thereby adopt to expected future situations (Bourne, 1978).

The roots of evolution in cities are considerable. Smithson (1968) argues that evolution in structure of towns is based on evolution in structure of society. The evolution of the structure of society is the growing human awareness about what constitutes existence and part of this recognition existence is the consciousness of space-qualities.

### 5-1-4 Development

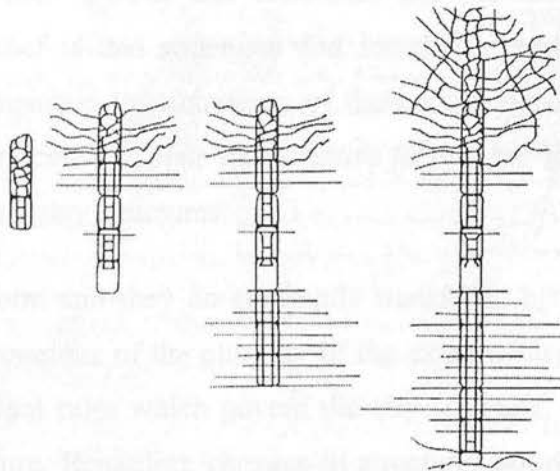
Bearing in mind the general meaning of *development* which refers to grow or cause something to grow gradually, to become or make something larger (Oxford Advanced Dictionary', 1995), the specific purpose of the term in the urban field refers to more advanced or more organised, a new stage or event. Development is a process that links different stages in time. Madanipour (1996) believes that understanding the process of development is incomplete without addressing the social and physical contexts in which it takes place and focusing on the dynamic interrelationship of these aspects. He recognises other notions of both structure and action in the development process. Although Bourne (1978) indicates the non-physical nature of development in arguing that some cities have to redevelop themselves as they grow, his explanations of how to organise or recognise urban expansion imply physical aspects of development by referring to patterns of concentric, separate clusters and linear development. Doxiadis (1968) who holds that a settlement is a living organisation and must develop continuously, insist that development must be related to all elements of a settlement. Man and society develop, and the shells and networks that accommodate these fives must change correspondingly. By this statement he puts the non-physical aspect of development in the centre of his analysis, and its results in the built environment as the cause. Caniggia attempts to grasp the dynamics of urban form in its historical development through the evolution of the types. He calls these dynamics a typological process. Doxiadis (1968) states that true development only take place through the *transformation* of the structure of existing settlements.

## 5-2 Structural Transformation

To *transform* is explained as to change the appearance or character of something completely (Oxford Advanced Dictionary, 1995) and *transition* is the process or moment perceptible of change from one state or condition to another (*Ibid.*).

Transformation is the most central characteristic of a structure. According to structuralism (Piaget, 1968), structure is a system of transformation, which generates and is guided by its inherent laws. The three key ideas of wholeness, and self-regulation are tied together through the process of transformation in the structure. Transformation in a city occurs because of norms, semantics, and knowledge that are inherent in the social phenomena of that place. Transformation in a city structure is a result of growing awareness of man and society. The structure in each phenomenon is a source of transformation process. It continually experiences change and its results are manifested in physical and non-physical phenomena. In this case the results of transformation, should be considered as structural transformation.

Transformation increases the complexity of system, always guiding it from a simpler to a more complex system and structure. The continuity of the process of transformation relies upon patterns of surface structure, which can be sustained over periods of time.



The way a city can cope with all the pressures, changes and express the self-regulation, depends to how city manage to transform, to increase and enrich the system with clear distinguish between change and transformation. In the simplest terms, change is imposed; it is not from within, whereas transformation uses the resources inherent within the structure to enrich itself and its identity.



The equilibrium or balance between the *structure of* and *structuring* aspects of any system represents its innate ability to control its own internal process of transformation.

The transformation process in each phenomenon is done by its structure. Continuity in structural transformation and its results are manifested in the phenomena. Structural transformation is based on structural properties mechanisms like self-regulation and self-maintenance, which are real stages of a structure's construction and transformation, and imply the evolutionary process in structures.

Structural transformation and holistic viewpoints are bound together. The best concept of structural transformation could be achieved from Piaget (1968) that the transformation inherent in a structure never lead beyond the system but always engender elements that belong to it and preserve its laws. Transformation here means an intelligible change, which does not transform things beyond recognition and which always, preserves invariance in certain respects. This idea calls for a definite and inseparable connection identity to structural transformation. Boundon (1971) argues a process can be called *structurally stable*, since the structural parameters are constant at all the times considered.

Badgraven's ideas, expressed in 1952, refer to an important aspect of structural transformation, in which growth and coherence are the most striking feature of structuralism. His belief is that structures and forms can develop in time, get they remain a unity and maintain the coherence of their components at all stages of their growth. This statement concerns *time as formative factors* has to do first and foremost with changes within primary structures.

Cities have to transform and they do constantly transform, but when the change are inconsistent and unconscious of the plurality of the existing city structure, they inflict damage on the principal rules which govern the city structure, in spite of any partial survival of the structure. Regarding changes in structure, Bourne (1982) states that a structure can become static, in which case it has to be broken in order to grow, or it can be dynamic, thereby, permitting growth without obsolescence.

Structural transformation is a complex inter-related set of processes hold together as a unit and give character by the structure. Hillier and Hanson (1984) believe that a combination of structural stability and evolutionary morphogenesis lies in the fact that

individual members, including the ordering of space itself, transmit its genetic structure through an enormous number of varieties of real spatio-temporal behaviours. They believe the term *change* implies, changing within primary structures.

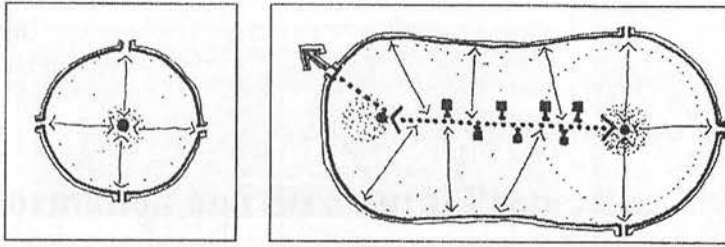
Structural transformation in a city clarifies the internal organism and mechanism of its growth and development through dynamic internal change. In this transformation all the relevant parts of the city interacts as a whole with its organisation.

The result of structural transformation is the preservation and improvement the whole city structure - global and local - properties and performance. Otherwise the consequence is, as Hillier (1996) indicates the emergence of new local structures that are out of adaptation with the global structures. This situation is exemplified by the imposition of modernism, which only truly achieved the total destruction of many old local structures. What this means is that, because local changes in a spatial complex can have powerful structural effects on the configuration of the whole, then as long as the principles of the city structure are maintained these could be considered as structural transformation.

A common result of structural transformation in city main structure is shifting the role of the traditional integration core in urban life. The results of Karimi's studies (1998), considering the present role of the historic core in English cities as a centre of commercial and trade activities, show that the traditional structure of the city has been reincarnated in the modern grid. This means that modernisation in English historic cores simplifies the grid at the local level, but maintains its global characteristics within the whole structure of the modern city. Therefore, the morphological properties of some core areas might remain intact; the local structure might strongly be affected by structural transformation in terms of its role in the whole urban structure and presents global spatial structure attributes.

Ardalan *et al.* (1973), taking the examples of transformation process in traditional Iranian city main structures, refers to the growth of bazaar as the *vital backbone* of the city. Within this structure, and in proximity to the *skeletal centre*, the *vital organs* of the city develop. In time, as the linear system of the bazaar grows, and the residential areas grow out from the main spine, the old skin is shed and a new layer is created, The identity and boundaries of man, his city and his universe are once again established.

This structural transformation pattern represents to him the religious, political, financial and social integration of the traditional city.



Another interpretation of transformation (Rossi, 1982) emphasises the physical aspect, explaining that the process of transformation in a city happens when the relationship between the dwelling areas and the primary elements of a city - which is responsible for configuration - change. To Rossi, it is important to know the mechanism of transformation and, above all, to establish how to act, whether through a total control of this process of change in urban artefacts, or through the control of principal artefacts emerging in a certain period that have outlived the dynamics of land use in the surrounding areas.

The ideas of Rossi (1982) in relation to structural property of wholes and the city's moments of transformation are interesting. He argues that moments of institutional change, cannot necessarily be related to the evolution of urban form. What is clear is that primary elements and monuments, because they directly represent the public sphere, acquire an increasingly necessary and complex character, but are not so easily modified. The residential quarter has a more dynamic character, but it nevertheless depends on the life of these primary elements and monuments and participates in the system constituted by the city as a whole. The evolution of such urban artefacts is taken to be a continuous natural process.

Karimi (1998) also discusses the links between the transformation of the spatial structure and the other characteristics, involved in urban activity. His analysis of English historic cores demonstrates that the relationship between the traditional urban elements and the spatial structure only remains similar to the past follow the same relationship to spatial structure as did the urban elements in the old cities. He adds that in the medieval period, the gradual and conservative process of change typical of English cities created unique pattern of urban structure, which incorporated the concepts

of irregularity and diversity, meanwhile managing to develop a complex urban logic based on configurations and relations. Ever since this period, cities have witnessed development different in size, scale and momentum, creating a new urban system that existed alongside.

### 5-3 Transformation and Structural Properties

Structural transformation is a process that is the result of *self-maintenance*, *feedback*, *homeostasis* and *equilibrium*. The processes that achieve *self-regulation* within structures and correspond to the laws of composition are analysable in terms of transformation. To achieve transformation in which the character of the system is preserved but its structure shifts to a qualitatively higher level of order in terms of complexity, the structural properties of *equilibrium* and *dynamic homeostasis* must co-operate. Mechanisms of self-regulation dictate the physical consequences and form of transformation in such a way that at any moment, the whole entity keeps its equilibrium.

Transformation is a process of movement of energy. This energy comes from the *whole* entity of the city but if it is following the structural *laws of composition*, so the energy increases. A structure aims towards an ideal stability through the mechanism of feedback. The consequence is dynamic equilibrium.

No structural properties can undergo transformation without effecting changes in all elements. Structural transformation of a city can only enable its parts to transform themselves if by doing so they present the whole. This is because of the property of *wholeness* within the city structure.

The structural properties are mutually reflected to transformation. Transformation influences the *centrality* in settlements not only for shifting centres, but also for a whole hierarchy of centres and sub-centres that pervade the urban structure because this process is not a steady state (Hillier, 1999). In the process of structural transformation at all levels of the hierarchy, centres might grow and fade.

Blumenfeld (1982) dwells the idea that, as the city grows, its *centrality* increases; the centre becomes stronger. Centres may shift location or change their dominance; may transfer their point of gravity away from the original centre. When this occurs, the

dominant core still remains, although it might become surrounded by a series of secondary centres distributed along the main routes. The structural property of *centrality* is thus open to different physical patterns that arise through transformation. On the basis of centripetal growth, the city today has tended to shift along one or two directions leaving the old core stands at the edge of the city. Only if cities expand in all directions more or less equally, does the centre of gravity remain at the original centre.

### 5-3-1 Surface structural properties, physical characteristics

The surface structural properties of a city structure as its public places and monuments, open spaces, urban grids as well as activities and social behaviour, or main axes contribute to the physical manifestation of the transformation.

Kepes (1965) explains that very common pattern of surface structural growth in cities is that each part merges into a structure on a larger scale. Both separation and continuity are interwoven and demonstrate the relationship between the units and aggregates on different scales. Structure on one level, by its imperfections or variations, always gives rise to a new kind of structure on a larger scale.

In *A plan for Tokyo* (1960), Tange searches for a new conception of structural transformation. He proceeds from the existing urban structure and aims to progressively modify as a process. He endeavors to develop flexible organisation plans that follow the dynamic lines of force of the different urban functions. In the idea called *Megastructuring* - urban structures for the expanding Metropolis - *information and communication* network which is capable of growth and change is necessary (Kostof, 1991).

Conzen (1981) refers to morphological formation and transformation which either can occur in an *adaptive* way, when the redevelopment of a block of land remains within the framework of the streets, or in an *augmentative* way, when the process involves the creation of new streets. But Karimi's study on continuity and change (1998) reveals that physical modernisation of the urban grid, dictating a new type of urban morphology that can be in contrast or in harmony with the old core, is able to transform the spatial structure, and consequently the other aspects of life in traditional cities. This highlights



how structural transformation necessitates a mutual interaction or a totality of deep and surface structure.

There are fixed and changing elements in the city surface structure in transformation. To Smithson (1968), the distinction between the changing and the fixed should be observed as providing concentration of energy on the long-term structure. The urban road system is an example of a fixed thing, as it only changes changing on a long-term cycle, but it is a fix that connects, and this makes it quite different to those of fixed historical elements.

The ideas of Lynch (1982) are that fixed elements role in physical change in surface structure with possible structural influence when he discusses of building a number of new foci throughout an area. He believes that if these points are strategically placed, and they are strong enough to survive for a time on their own, then they will 'infect' the areas around them, and inspire the whole to change. This was the Baroque strategy, which relied on creation of new focal points to renew a city.

As physical growth happens within the city main structure, districts in its vicinity would be influenced. Expansion takes place into the contiguous districts and the displacement becomes compound. In the contiguous districts, external pressures to expand are frequently as great as the internal growth pressures.

### **5-3-2 Surface structural properties, functional characteristics**

A major concern with the deep structural property of dynamism and change in the spatial organisation of the city is functional changes. Urban structural transformation and its visible changes in urban places occurs with respect to spaces needed for activities and meeting socio-economic needs. This means that not all the functions are structured. Surely the structured functions must remain central, or the city structure is dead.

Kostof (1992) mentions several examples of historical changes of function of an urban place. Some of these functional changes are reoriented to accord with the shifting centrality implied by structural transformation. Most of such changes happen in the main structure domain and the public major land-uses. The functional changes play

important role in the whole city transformation. Bird (1977) argues that as a city grows some degree of decentralisation will surely occur. The systems of centres within a large area may be regarded as forming a hierarchy or as each function develops its own centre within a specialised precinct.

The term *in transition* used by Burgess (1923) describes a zone that is involved in business and manufacturing activities moving out of the old centre. This is one of the most common patterns of functional and physical transformation in urban surface structure. Changes in land-uses and in the densities of central areas in cities together affect the structural transformation of a city.

Physical growth of the cities has a direct interaction on the functional changes. The influence of these both on city structure emerges in the hierarchical pattern to support the vast area of the cities. This transformation mostly works at the level of function, which shifts the local level of the urban activities to the city-wide level, and so the main structure can provide the global functions. The first consequence is replacing land-uses that satisfy daily needs with those that satisfy city scale needs and the resulting homogeneity of the scale causes a new functional order. Doxiadis (1968) argues that the solution is not decentralisation, but re-centralisation, by creating a system of a higher order and a corresponding circulatory network, which takes over the pressures and functions from the higher order.

City growth in some cases caused fundamental changes in the importance of the city centres, especially if the old physical characteristics of the centre cannot provide proper accessibility, the new urban functions shift to the new streets and the old centres loses its importance and most of its functions. The consequence of this changing pattern is that some public functions, which are not shifted to new developed areas, might become abandon and so loose their civic function and significance.

Transformation is visible in the physical form of the public places. Rigid forms are less able to accept transforming activities. Some functional transformation needs physical change as well, so demolishing old public places for new land use has to be considered as a solution in some cities

According to Karimi (1998), the radical modernisation of urban structure in many cities, brought disintegration and alienation from the old core. It broke the links between

transformation of the spatial structure and other characteristics, which complete the urban activity. As transformation of the spatial structure always correlates with other changes in the historic core, radical modernisation was not a transforming process.

A city persists through its complex or simple transformations of its functions. While *change* within a city and its main structure is influenced by forces that are imposed from outside, *transformation* is a change which emerges from within tackling by *underlying forces*.

## 5-4 Transformation and Underlying Forces

The transformation process of the urban structure is not one-dimensional. The underlying forces are all involved in guiding it such that the changes in physical forms and structure of cities respond holistically to the dynamic needs of society.

Transformation happens when all the underlying forces work together. If only one force injected to the system and it cause a response of a particular nature, after a while, the self-regulating property in the system will seek to reject and desert the physical and functional consequences of that force. Underlying forces produce transformation and the relationship between the surface structure of the city and the forces acting on it generate the modes of this transformation.

In the modern period, a significant number of changes can be explained on the basis of planning, inasmuch as this constrains and controls the physical form, its tendency is to interfere with the natural transformation of the city, for economic forces tend to exert a major influence over planning. Today the city is subjected to forces that push more radical transformations of its structure and form.

Bacon (1974) believes that each development should be inspired by social and economic forces, to be capable of providing a structure suited to modern needs. But for Hillier (1996), the spatial and physical development of cities is, ideally, held to be a reflection of the social and economic process, which provides reason for their existence. Differences in these processes are likely to give rise to differences in types between cities. It seems then to be specific social, economic and cultural processes, rather than generic spatial laws, that are the driving forces of urban form.

People adapt the physical structure for many reasons: to make life easier, more pleasurable; to give esteem for themselves. At different periods in history, the rate of change has varied because societies have had varying levels of economic, technological and intellectual resources as well as varying perceptions of political necessities (Lang, 1994).

A city grows as a result of responding to the pressure coming from or existing in the city main structure, which is more concentrated and presented in the various forms of underlying forces. Social, political and economic interests are intermixed in the process of urban restructuring throughout history. The spatial structure has an important relationship with other forces in a changing urban environment. According to Doxiadis (1968), a city structure's dynamic growth takes place if the physical characteristics of the city are flexible and could respond to the requirements of the settlement's growth. The underlying forces, which are most effective within the city main structure, are the generators of change, growth or deterioration in the area. Kennedy (1974), using the term *inner city*, explains that this change is not only a matter of scale, but of function and social fabric.

The pressures to change must equally be kept in check by the physical nature of the city; its historical continuity through which the people retain an attachment to the past must also stand as a corrective force counteracting rapid changes and adapting them to the spatial and physical typologies that characterise the city. In this way changes involve mechanism of feedback, ensuring eventually transformation rather than revolutionary change.

Karimi's case studies (1998) show some consequences of structural transformation. If the external forces are not extreme and destructive, the urban core requires an evolutionary solution for adapting to modern needs, for example through widening the streets and other trivial spatial changes, without sacrificing the old principles. But if the external forces are powerful enough to create dramatic change, like Haussmanisation, the modern grid can overwhelmingly change the structure of the historic core. This effect is not just about partial destruction of the physical fabric, rather it is about the segregation of the historic core globally, and termination of the traditional local pattern of integration.

Hillier (1989) argues spatial transformations are incorporated and coherent with the process of development, change and progress in scientific, technological and economic and other aspects of the society.

## 5-5 Rules of Structural Transformation

Rules that govern the ways in which transformation takes place within urban structure and its central part are considered in this section. To the author these rules should be the main concern in any study of the structure of the city. Hillier *et al.* (1972-3) believe that the application of rules of transformation to an underlying structure explains the set of phenomena it underlies, by showing how they could be generated. The application of a number of rules links the concepts of deep and surface structure, and identifies the process of change and stability in time and space.

According to Piaget (1968), the rules of structural transformation never yield results external to the system nor employ elements that are external to it. Based on this idea, the rules of transformation employ the underlying forces as deep structural elements and the urban elements as surface structural elements to provide transformation to the urban structure. Character of transformation of a structured whole depends on structural properties and the mechanism that they are activated. Rules of transformation are structuring. Order, a result of the structural properties, manipulates the transformation implicitly.

For Hillier (1996), the effects of '*globalising rules*' are on that certain key properties tended to remain constant. The effect of these rules is to maintain both the intelligibility and the functionality of the settlement, to maintain a strong relation between the different parts of the settlement and between the settlement and the outside world.

Increasing knowledge from simple to more complex is the essence of transformation. Any structure's tendency to increase complexity, is an intrinsic rule. In a city to increase its complexity, its transformation benefits from new feed back, flow of energy emerging from underlying forces. That energy would be guided by all structural properties. If it were not relevant to the process of transformation, it would be rejected through self-regulation and through homeostasis. Only energies that fit into the system give



movement towards transformation. So if the energy were not appropriate it would be broken by the power of structural properties and their mechanism of working together.

Alexander (1964) applies rules to the changes in urban spatial structure. He states that the built environment achieves its spatial structure, not by sudden design, but from continual growth and change. These changes are far from random. They are controlled, at any given moment by a system of rules; legislative rules, rules of incentive, and unspoken rules of habit.

All structures pass from a simpler to a more complex state (Piaget, 1968). Growth can be characterised as qualitative when a new functional complex is added to a system. Growth can be characterised as quantitative when existing complexes are expanded (Lazano, 1990).

Structure on one level, by its imperfections or variations, always gives rise to a new kind of structure on a larger scale (Kepes, 1965). Settlement spaces tend to grow by accumulating spaces into one continuous system, richer in its potential, with more access to the central parts. If a new addition contains the intrinsic structural integration, it also forms a more developed integrated structure to which future's development must respond.

Every time the addition or subtraction of an element or part of urban structure happens, the properties of the whole structure change. Hillier (1996) believes that simple local changes in a spatial complex can have powerful structural effects on the configuration of the whole.

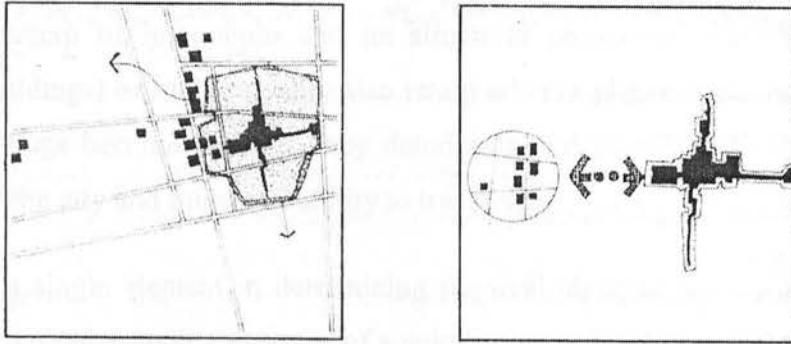
The spatial structure is the integrator of urban components and activities. This integrity is necessary for structural transformation because it supports the structural property of wholeness. As long as this essential integrated structure survives, it can preserve many features of the old system within itself, but if it is altered dramatically, it can no longer maintain its continuity. At the same time as a population grows, increased demands, more communication, more information exchange and greater complexity emerge. The consequences are changes in technology and in the social and political systems, which indeed create new urban spatial structure. These all are various forms of factors of underlying forces that interfere in the structural transformation.

To satisfy the rising social and political demands for changes, a new structure of urban system, by a transformation in the physical structure of the cities, emerges. If the external and internal pressures for change are not strong enough to destroy the intrinsic structure of the old city, the process of growth adapted with the old organisation, which can be identified as *evolutionary transformed* cities. In evolutionary transformed old cities, surface or physical structural transformation is created through the integration of existing places with newly created one. In these cases the new urban elements are adopted by the structure whole.

*Organic growth* is a physical aspect of evolutionary transformation in flexible structure, along which development could take place. Organic structures can reveal the principles and laws of urban growth, which are based on the evolutionary fulfilment of the needs of inhabitants during the process of spatial formation. In general, organic processes of transformations are associated with slow growth. If there is a considerable period of natural growth, and also if there is no imposing power to control the geometrical patterns of the city, even artificially planned cities can adopt organic pattern of growth and eventually became organic cities. Planned growth, which embodies the actions of somewhat larger agencies, can interfere with the natural process of transformation if its criteria do not follow the rules of transformation of the city structure. Batty and Longley (1994) argue that planned cities or city parts are usually more monumental, more focused and more regular, reflecting the will of one upon many or at best, the will of a majority through its selected representatives. By this planned growth based on imposed forces that are not necessarily originated from intrinsic underlying forces. Revolutionary examples of change mostly happen when planned growth interferes in the organic structural transformation of a city.

Regarding changes in surface structure characteristics with great impacts on structural transformation, rapid modernisation is considerable. In many cases it has created contradictions between the old and new, not only in the physical structure of the city, but also in the cultural aspects of the society. Many commercial and public activities moved out of the old city, eventually bringing about disintegration in the traditional role of the city centre. There have been drastic changes in historic core in terms of the pattern of land-use and activity. On the other hand, the radial expansion of major historic routes towards the outskirts of the cities, where new demands can, to a

substantial degree, be met, usually keeps the historic core as the nucleus and hub of the modern urban environment.



Physical or surface transformation can emerge without fundamental changes in the deep structural concept of centrality. Centrality could be expressed a radial or linear form of growth. The concept of a centre remains while, as Ardalan *et al.* (1973) argues, the centre of a city, as a single point in space, moves in time and creates the lifeline or spine of a city like the linear elements of bazaar in traditional eastern cities. Or, as Banerjee *et al.* (1990) explains, a central core can be retained as if long arms of development extend naturally from it, in a star form.

Changes in underlying forces can cause huge pressures. The main city structure will likely collapse if various characteristics of the old city structure are not able to respond to new demands and changes in underlying forces. The greater the flexibility of physical and functional characteristics, the greater stability for the city structure. The centres function as stable focal points of change, if they are stable in location, giving the city continuity in time, preserve historic symbols, but will not freeze the patterns of use. For this form of transformation, the main centre of the city structure is not necessarily bound by the structure of the past. The continuity of social life within the old main structure is essential to enhance the structure that is already there, instead of tearing down the whole area, strengthening rather than destroying social institutions, and human associations.

An important rule of structural transformation is dealing with the continuity of values, through preserving vitality and integration into the old structure. When the traditional surface structure is preserved, the traditionally important spaces maintain their value and the significance of their location, socially, culturally, and economically become

desirable. But when the old structure is destroyed, the old spaces lose their underlying socio-economic significance and consequently, lose their viability to be used appropriately or to generate profit. Thus, when the urban structure follows the traditional pattern of integration and its structural properties, the urban structural elements (buildings) of higher quality also retain a better physical condition, but when the old buildings become isolated, they deteriorate and so affect the deep structural properties of the city and impair its ability to transform.

The role of a single element in determining physical changes is considerable. In the visible and physical growth, the power of a point in space demarcated by a feature could become the determinant in later changes. The single point in space can become a powerful force to bring order out of chaos. When the centre grows around a set of basic nuclei - the cathedral, the town hall, the market - generated spaces (squares) become venues for specialised public activities. These buildings and the spaces around then are able to focus the civic life of the city and symbolise its meaning. By this way they could become the starting points of transformation in visible city structure.

Regarding this issue, Lynch (1982) argues that change might be affected by building a number of new foci throughout the central area. If these points are strategically placed, and strong enough to survive for a time on their own, they will *infect* the areas around them, and cause the whole to change. The dominant core remains, if it is surrounded by a series of secondary centres distributed along main radials branching out from the core.

The role of movement networks and its linear (streets) and nodal elements (stations or junctions) is important in the physical aspect of transformation. Because these places could be the major attraction for developing public functions and new establishment, they are able to involve the whole process of transformation of the city structure. The influence of this attraction on the major city centres and the combination of the activities are inevitable. Some of these places later transfer to a new city centre or join to the old one. In this regard Doxiadis (1968) writes that the closer to the main lines and nodal points of importance, the greater the changes these areas have to meet.

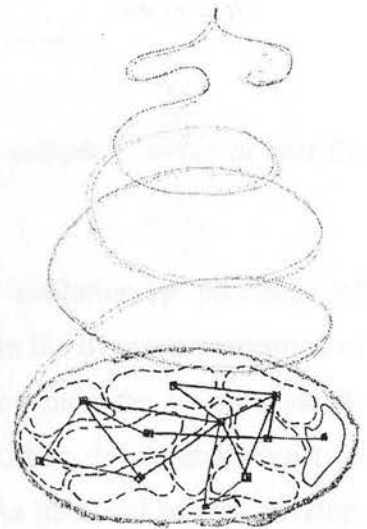
Lozano believes (1990) that a universal law of growth is that of equal advantages. This in general terms, governs the distribution of elements of a structure among the various parts of the structure. This idea comes close to the structural property of equilibrium in

the city structure. The results of loosing equilibrium are instability in the whole structure and so disruption in the natural process of transformation. The consequence of the disruption might be stagnation or deterioration in the city structure. In terms of deterioration happening in some cities, this form of change is not necessarily contributing towards achieving a higher level of complexity, and the structure loses its function, then moves towards stagnation. Stagnation also happens if a system is not fed by a new stream of energy; it ceases to transform. In a city that expresses stagnation, the process of transformation not only stops, but the structure starts to break down. For a structure is a system of transformation; transformation is its purpose and the process through which it exists.

Although imposed planning that absorbs the intrinsic energy of a city structure might bring collapse to the whole system. If any basic part of the system structure survives then there is a chance that the embedded indigenous knowledge can re-express itself in the structure to increase the complexity and compatibility of the system, in terms of appropriate energy for starting a new phase of transformation.

Transformation is a result of interaction between underlying forces and structural properties. The specification of a process of transformation relates to the way the properties have left impacts on how people adopt the forces within the urban structure.

As the structural properties are intrinsically stable within the structure, so the mechanisms of this interaction leave evidence either on the surface structural characteristics or on the transformation of the underlying forces, like cultural transformation.



This approach is basically founded on interrelated notions: that urban form has physical, psychological and social dimensions. Understanding the rules of transformation is not complete without addressing the social and physical contexts in which it takes place and focusing on these dynamic interrelationship and natural evolution. As a result, underlying forces are in transformation to accomplish the structural property of transformation.



The regulation of space production is a central task of the transformation in the city structure. The relationship between the state, the market and space production can therefore be analysed in terms of structural transformation. Looking at social relationships means to address the dynamism and change within urban space. To see structural integration with time and transformation in surface structural characteristics as well as underlying forces offers a dynamic approach, in which all structural elements are constantly changing. Urban spatial structure and form cannot be regarded as a separate static entity, but can be recognised as being a continuous evolutionary process, which has physical expression over time

Based on rules of transformation that determine the way the underlying forces confront or generate the structural properties like the laws of composition and order, the city main structure in the process of transformation is the centre of stability and dynamism, which provides the essential energy for transformation and permits the growth of a central city structure.

## 5-6 Conclusion

*A city, however perfect its initial shape, is never complete, never at rest (S. Kostof, 1991).*

Cities have always been the subject of gradual and evolutionary processes of transformation. Cities are never still. Urban evolution lies in the dynamic perception of space and its characterisations. The city's main tendency must be to continue its transformation from a simple to a more complex state. Urban development must be related to all its surface elements and underlying forces. As man and society develop, the shells and networks that accommodate these in spatial or physical patterns must change correspondingly.

A city is a product of time (Mumford, 1940), a historical creation (Benevelo, 1980), the embodiment of history (Olsen, 1986), and hence itself a historical process (Blumenfeld, 1982). The form of city is always the form of a particular time of the city (Rossi, 1982).

Structure implies transformation. The structure transformation of a city is immaterial in its nature but includes visible consequences. Transformation mostly has fundamental

impacts on the city structure and its main part. Transformation is the source of changes that maintain the human needs for stability, continuity and familiarity within the city structure and urban life.

Each period of urban life makes its own specific demands on the public realm. Each form of urban society, with its own cultural, technical and economic conditions, recognises its own manifestation of the public realm. When, as time passes, new manifestations emerge, yet other previously existing manifestations are not immediately or comprehensively swept away. It allows the history of the public realm to be a process of transformation.

Changes in the physical structure of organic settlement result from everyday usage by its inhabitants. Other changes are purposefully planned by groups of people who may or may not be inhabitants, and in response to their new needs. Transformation in cities contributes to the elements as well as the whole system structure, regarding physical concept and also economic, social-cultural situations. Transformation stimulates physical growth and urban development and causes transformation in the structure of city itself.

Transformation is a more refined process than other forms and interpretations of change, development and growth. It relates to the internal interactions of structural elements and their new demands for new organisation. It is an endless cyclical process that constantly organises and enhances the relation between the major urban elements, is a result of surface transformation. The process organises the relation between urban structural elements and the deep structure properties.

Transformation at any stage seeks the integration of the deep structure, underlying forces and the surface structure. Transformation in the city structure also refers to the changing process in the visible characteristics or appearances of the surface urban structural elements and that every transformation correlates with the original core.

Growth is defined as physical changes and increasing size. Growth in the city structure and its main structure area implies shifting of central activities that can no longer be sustained by the centre towards the neighbouring areas. The dynamic growth of a city as an organism derives from continuous change of structure, functions, texture and density. Structural transformation, however involves the concept of durability.

Cities do not grow or change of themselves, or reproduce or repair themselves, but all the changes are inevitable responses to underlying forces generated by urban life. Thus, transformation in the political and economic situation creates a demand for physical change. The process of change of the urban structure, and the way of structuring settlement growth, is generated from the interaction between economic, social and physical processes. The rate of physical transformation varies according to the levels of inherent economic, technological and intellectual resources.

The city's quality, its growth and survival, requires a well developing structure. Any extrinsic force that disarranges the balanced state of the internal structure of a city stimulates a counteracting the self-regulating response. Self-organising properties of the city structure, which tend to return to a new organisation and stable status, cause transformation. This dynamism is the major source of urban structural transformation. A city is always in transition and its main structure is the source of the transition.

An intervening process that generates change can be called *structurally stable* if the structural parameters are constant at all the times considered. Transformation of the city main structure area is related to its role within the larger urban structure. Organic expansion of the inner core of an earlier period sets the framework for later urban growth. What makes the city main structure role so critically important is that its transformation not only inspires patterns of physical scale, but also of urban function and social structure. Structural transformation always gives rise to a higher-level structure in terms of complexity.

The city main structure functions are stable by virtue of its ability to balance and maintain its dynamism need for homeostasis in a context of social-economic changes that drive the process of urban structural transformation.

The city main structure has the authority to shape the whole process of transformation of the city structure. Taking over the pressures and functions of a higher order is a consequence of evolution of city main structure in the domain of dynamics of urban structure transformation and structural properties.

By being a mutual interaction, structural transformation of deep and surface structure creates a whole of these aspects. The concept of city structure is conditioned by this transformational mutual process.

Transformation in city structure, in terms of structuralism, develops from understanding the reasons behind visible characteristics. Without studying the process of structural transformation and its consequences on surface structure, it is not possible to understand the motivation behind the characteristics of physical growth and development urban life.

## Conclusion to Part One

Part One of the research sought to build up a concept of the city main structure's properties particularly in the process of urban transformation based on the structuralist paradigm.

By a quick overview of alternative schools of thoughts on urban studies, structuralism was brought into focus, as a method to seek and clarify laws that guide the surface patterns of phenomena. The core idea of structuralism, which is the structure and its main properties, is reviewed to provide understanding of abstract meanings related to the city context, offering a bridge between the physical realm and its underlying laws. The process of transformation is a consequence of this bridging.

The structural properties that are agreed by most structuralist and considered in this study are transformation, self-regulation, dynamism, wholeness, laws of composition, order and hierarchy.

A structure is a systematic whole of self-regulating transformations. Transformation is an intrinsic process of moving from a simple to more complex state while maintaining the internal equilibration of the structure. Deep structure is the underlying order of inherent laws that makes transformation possible. It is the deep structure and transformation that generate the surface structure, the total morphology combining patterns of activity, physical objects and spaces. The resources of urban structural transformation come from the underlying political, economic and social forces as deep structural elements. Structural transformation depends on information that leads the structure from a lower level to a higher level of complexity. Transformation is also a result of dynamism, which seeks internal equilibrium between the underlying forces and the forces imposed from the surface structure to enhance the state of complexity of the structure.

The city is considered as an entity having a structure. The *city structure* has structuralist properties in terms of function, transformation and self-regulation. The city structure gives the whole city its physical and functional order. The existence and manifestation of the city structure through time is based on *laws of composition, order, and hierarchy*. Within this hierarchy, the super-ordinated and highest level is considered as *the city*



*main structure.* The city main structure is a system itself, which follows the same properties of the city structure. The hidden network of laws of composition determines the centre of power, stability, dynamism and transformation within the city structure, which permits the growth of primary elements and the expansion of the city main structure. The outstanding property of the city main structure within the whole city structure is its *centrality*. Regarding hierarchy and centrality as structural properties, the city main structure is the highest in terms of complexity it offers to the city structure. Analogous to the human body, it is like the mind in terms of making organising and enforcing decisions.

The city main structure is a source of energy that stimulates and maintains the dynamism, transformation, self-regulation and homeostasis of other parts. The city main structure remains as a guiding force throughout the transformation process of the city.

The city main structure is the outcome of interactions between various kinds of forces and these interactions determine the internal spatial structure of cities. What gives power to the central area is concentration of underlying forces in an organised complexity.

Underlying forces are the source of structural transformation. All these forces have roots in human needs. The surface structural elements (buildings and urban activities) offer opportunities through which the society can respond to the forces embedded in the city main structure. The spatial pattern of the city structure and its informal flow of energy are also manifestations of underlying forces. The structural properties of dynamism, self-maintenance and finally transformation reflect on the interaction mechanism of the forces through a sequence of countless events, actions and decisions, and social and functional expansion. According to structuralism, the process of equilibrium and homeostasis of the city structure leads the underlying forces always to find balance.

The physical concept of the city main structure refers to an area that is loaded with concentrated flows of energy. The visible city main structure was formed by the physical manifestation of the deep structural properties and is a result of combination of their physical and functional characteristics. The city main structure is the integrated locus of the maximum concentration of built form, activities, population and traffic,

public accessibility, and city, regional or nationality significant land-uses. Having the greatest influence over the citizenry and on their memory is the most noticeable character of the main structure.

The role of the city main structure in urban life is the logical result of its functional characteristics supported with its physical properties. Urban public places of the city main structure are given to a society as a set of potentials, satisfying an unlimited set of human needs, for socialising, exchanging information and cultural products, and for creating activities. The role is reinforced by variety of choices and mix of activities both day-time and night-time, and by giving the opportunity for ordinary people to support the process of city transformation in the daily rhythm of their lives. The city main structure is the source of income, of cultural inspiration, of social motivation, and finally carries the entire urban heritage in its existence. The surface main structure is a physical reflection of many political events with cultural values that have converged to form collective memory of the society and represent the story of the city.

The city main structure as a structure in transformation prevents the urban system from stagnation and from ceasing its throughput and use of energy. Its tendency is to continue its transformation from simpler to more complex nature. City structure transformation is immaterial in its nature but includes visible consequences. Structural transformation is necessary to activate stability and continuity of the city structure and urban life.

Transformation covers all other forms and interpretations of change, development and growth, and physical, functional, economic and social systems. It integrates all structural elements and their new demands for new organisation in an equilibrational whole. Any extrinsic forces that disarrange the balanced state of the internal structure of a city, find themselves opposed or manipulated by the structural property of self-regulation, which exists to return the city structure to a new stable state of organisation.

Structural transformation is rooted in the mutual interaction of deep structural elements. The concept of city structure is conditioned by this transformational process. Surface structure is the visible consequence of transformation caused by underlying forces, which are self-regulated by structural properties.

Applying the concept on the city main structure and its role in urban transformation, as built up in Part One in empirical works and case studies is considered as a way to

enhance its theoretical achievements and test it against real processes of transformation and its city life.

The next part of this thesis seeks to do just such a task, making explorations into two cities which have, over their histories, undergone many large and small, planned and unplanned transformations and changes, are considered to be of exceptional value world-wide and are associated to specific cultural life styles. These studies are intended as a mean to complete as much as to test the theoretical findings covered in this part.

## *Part Two*

# Empirical Studies

## PART TWO

## Empirical Studies

## Introduction

The literature review in Part One identified specific urbanisation problems and the philosophical basis of structuralism and the theoretical aspects of geographical approaches towards urban understanding. But there was also hidden but highly visible 'policy' of value and 'politics' underpinning the spatial organisation and transformation of urban settlements.

Part Two is an inductive empirical approach in the form of case studies, qualitative and quantitative mapping techniques, in short 'policy' informed images of the city transformation. In this study approach, scientific influences of theoretical approaches are almost side by side with the findings of an empirical qualitative research survey.

Part Two consists of three chapters. The first two chapters review with the history and transformational characteristics of the selected case studies, to bring across the contrasts and shared features of the cities of Edinburgh and London. This part ends with a comparative conclusion based on the results of the case studies.

In the following two cities of Edinburgh in Scotland and London in Great Britain, the author has selected case studies, which had a close relationship with the field of this research. There are two historical capital cities, which have experienced rapid organic and planned growth phases. In terms of size, location, historical and cultural significance and economic as well as political importance, the two cities are comparable. The two cities have experienced different trends in the past century. The Edinburgh case study is a historical review of the city's urbanisation process, the London case study is a historical review of the city's urbanisation process. The Edinburgh case study is a historical review of the city's urbanisation process, the London case study is a historical review of the city's urbanisation process.

## Part Two

# Empirical Studies

## **PART TWO**

### **Empirical Studies**

#### **Introduction**

The literature review in Part One addresses specific abstract aspects which emerge from the philosophical basis of structuralism and its theoretical results. It provides an approach towards better understanding that there may be a hidden but highly internal 'reality' of rules and patterns underpinning the spatial organisation and transformation of human settlements.

Part Two is an inductive empirical approach in the form of case studies, questionnaires and cognitive mapping techniques, to elicit people's inherent images of the city main structure. In this dual approach, concepts informed by theoretical discussions are observed side by side with the findings of an empirical qualitative research survey.

Part Two consists of three chapters. The first two chapters open with the history and transformational characteristics of the selected case studies, to better express the contrasts and shared factors of the cities of Edinburgh and Isfahan. This part ends with a comparative conclusion based on the results of the case studies.

In the selecting the two cities of Edinburgh in Scotland and Isfahan in Iran, the author has chosen case studies, which had a close affiliation with the field of this research. These are two historical capital cities that have experienced both organic and planned growth phases. In terms of size, location and historical background they have some similarities as well as differences to shed light on the broad idea of the consequences of growth and transformation in the structure of old cities. The historical studies include a literature review on the case cities and on the transformation of these old cities through history, the patterns of their organic structural transformation, the role of their urban centres and spatial norms under modernisation.



To provide theoretical outcomes, the study of the rules of formation and transformation of the main structure of the cities involves interpretations of urban growth, the definition of urban elements particularly within the city main structure, and the long-term evolution they have undergone.

The case study thus correlates spatial configurations with socio-cultural and economic activities, to study the past, 'seeing yesterday's skeleton under today's flesh'. An underlying premise of the study is that it is an obligation of the city planners to integrate for intermingle the physical structure with the underlying forces of deep structural elements like social and economic patterns of urban life and to understand these through the various phases of transformation in urban life and its visible spatial organisation.

Much data is elicited through the questionnaires with the objective to building a conception of shared knowledge derived from people's observations about the application of the city main structure in the actual life situation of a city.

To summarise, Part Two is the combination of general theoretical ideas about the subject under discussion with the actual examples of urban transformation; bringing into account the consequences of this transformation is the intention upon which the main body of the thesis was based.

Using the theories outlined in the literature in the content of the physical projection and compositional exposition of these theories in urban space leads towards understanding how urban objects form and construct the urban surface structure. An awareness of deep urban structure based on its visible features and characteristics, accompanied other types of approach - such as the cognitive maps or illustrations of the physical city structure - sheds light on the underlying forces of deep structure and opens up a new look to urban life in our existing cities.

## **Methodology**

The necessity of the case study, especially for the urban studies, implies strong concern on concrete as well as theoretical sources of knowledge. Through observing real cases the

original hypothesis is tested, applied and refined. This methodology provides the opportunity of inductive analysis.

The characteristics recognised as being essential for the adopted methodology are based on an analytical explanation of spatial and morphological phenomena, functional life, underlying forces, general rules of transformation and lastly a comparative research for final outcomes. The study tends to be analytical rather than descriptive. The methodology of observation, data gathering and of analysis, is therefore more qualitative than quantitative and explanatory rather than descriptive.

As urban transformation is strongly linked with the physical manifestation of the city main structure, thus the methodology has to be capable of dealing with morphological and spatial issues. It also needs to be analytical to highlight any underlying forces that play a role in the transformation. The exercise of seeking a comparison between different cities should be useful in correlating the underlying forces and their spatial and morphological output with the activities of the two societies. To study the urban structure, the analysis of the main elements, the way they are composed and their interrelationship are all considered together.

*There are two perspectives from which to analyse the urban space to find out how it is structured, one that concentrates on people and the other on buildings and objects*  
(A. Madanipour, 1996, p.63)

The methodology comprises of a mutual survey strategy, which involves the inhabitants of each place and trained or expert observers. It is based on the assumption believes that people are knowledgeable in spatial configuration, although they may not be fluent in the professional terms or concepts used by experts (Bania, 1999).

The research also moves from an *abstract* to an *actual* domain, supporting the abstract concepts with actual descriptive, explanatory and comparative insights into the meaning of city main structure. It is also felt that the diversity of the actual cases is an appropriate basis for seeking out shared structural results of transformation. The comparative methodology draws attention to many similarities and differences among the cases. The theoretical conclusions are generated from these similarities and differences.

Open-ended questionnaires regarding people's views about the cities and their main characteristics provide a great opportunity to expand and enrich the literature about the subject. People's participation provides a vast range of insights beyond the researcher's observations, and the reasons that they mention explore deep below the surface realities of the subject. The aim of the questionnaire is to *see through the eyes of the people's*. Blalock (1970) states that this technique is extremely useful in providing initial insights that can lead to more careful formulations of the hypotheses.

Urban theorists have stressed the importance of city structure in environmental cognition (Appleyard, 1976, Lynch, 1960). A part of the methodology used in this research is based on using cognitive studies either verbally expressed or through drawing sketches. Ackoff, and Emery (1972) explain that mental image is the collection of structural properties and the relationships between them. Images connote structural properties, but concepts connote functional properties. Bong (1978) believes that a city has both an objective physical structure and a psychological or cognitive structure. Banerjee and Southworth (1990) also state that cognition is an individual process but its concepts are social creations.

The perceptual form of the city main structure, its major elements and spaces can be read through cognitive maps, drawings by ordinary people, which indicate the most important elements. They are used to support as the other parts of the methodology in the case study.

The qualitative questionnaire prepared for the thesis is a semi-structured, open-ended questionnaire to which respondents can respond in their own words at any length. It is divided into 6 parts and 30 questions. The questions asked for the most important places in the city and the reasons of their importance, the places of major urban activities and also the most important urban functions. It ends by asking people to draw a sketch of the city and allocate the most important objects (buildings, streets or features). It also asks that they indicate the location of a given list of buildings on a city map, and can recognise by name pictures of the city features shown to them.

The number of respondents to the questionnaire is 30 for each of the case studies. This number seems adequate for an open-ended questionnaire. Silverman (1993) argues that the optimum sample size, when investigating on an experimental level, is about 25 to 30. Bourne (1978) remarks that qualitative research studies are often conducted with small

samples. The target population is a *random sample* and covers a vast range of personal profiles in order to look at different levels of knowledge and attitudes.

The quantitative evaluation tests the validity of theories as evidenced in the responses. The results and analysis are given in the form of tables and maps. The quantitative results in the form of categorised numerical results, including tables, histograms and maps, support the researcher in the qualitative analysis. The highest frequencies are called core categories and considered as the focus of analysis and conclusion.

*The relative importance and ranking of the elements are driven from the structure of the interrelations of the elements instead of the number of times a single element is observed. Furthermore, from assessments of the interrelations of elements, accents of the perceived connectivity of the elements are obtained. Thus, an account of the image of structure is provided. The approach retains a statistical quantitative account of observer variation and group consensus of the images of structure (R. Bania, 1999, p.134).*

The reasons are understood to be the underlying forces or various dimensions of the city deep structure, causing the visible characteristics that are demonstrated on the surface structure.

The conclusion to the analysis focuses on the inhabitants' perceptions of the values of surface visible structural elements, and how the city structure properties operate as a whole in the process of structural transformation is understood by people in their daily life and the history of the city.

Studies of the evolution of the city main structure comprise the physical-historical urban transformation. These are elicited through the field studies as well as through the available historical documents and books. The intention was a kind of historical study that uses a structural approach and seeks the structural relations of the elements in the framework of the structure's transformation through time. The study approach tends to concentrate on the mechanism by which structural transformation emerges from the old structures in a compatible manner. In this regard, the type of the historical information gathered and considered was intended to show the degree of solidarity and evolution of the city structure and to enable the research to convey the main patterns of the urban structure.

Introducing the case studies starts with what one can see today. So by a historical review of the city main structure evolution, and by reading the underlying forces, the structural properties and the transformation of the city structure is discussed. In this process the structural transformation is interpreted according to the properties of the structure, based on the visible surface structure. The case studies are used to make the theory tangible; to support hypothesis and show how a city operates.



# Chapter Six

## Case study Edinburgh

## Chapter Six

### Case study – Edinburgh

#### 6-0 Introduction

This chapter is an application of the concept built on structuralism, which is introduced in the first part. The case study are addressed from the structuralist point of view with emphasis on structural transformation, how the city structure engages with self-regulation, homeostasis, hierarchy, and with the laws of composition. The focus is on the property of transformation, which would represents the rest of the properties.

The process of transformation is analysed based on the underlying forces. Although transformation is a holistic process emerging from interaction of the forces, for the sake of this research, each underlying forces is reviewed separately. This analyses the role of different structural properties in the process of transformation using of each of the forces as a guide to the investigation.

The approach considers the city main structure, but also puts emphasis on seeing the city as a whole, and one that benefits from the wholeness of structure as an entity, a unified organism.

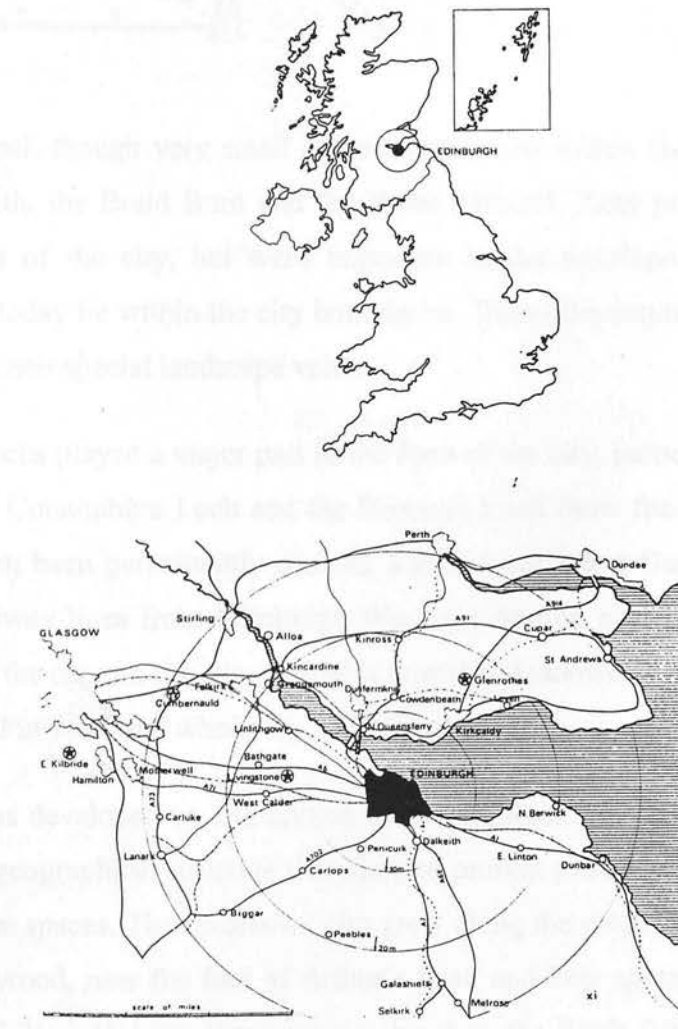
To review the process of transformation of any of the underlying forces, the surface manifestation of that deep structural element (the forces) is addressed, either in the form of buildings and places or as events and activities. The focus in the case study is on the concept of how events and buildings as surface structural elements could be used as evidence of transformation, introducing a new method of understanding the reality behind the visible changes of a city.

Using an open-ended questionnaire method facilitates the case study with a broad range of individual and collective beliefs and presents a reliable cultural and social basis for analysis. Using a questionnaire addresses what people see as the surface structural elements. The underlying forces could be traced behind reasons of importance of the mentioned public places. The reasons of importance will identify the deep structural dimensions of visible structural elements.

## 6-1 General Historical Review

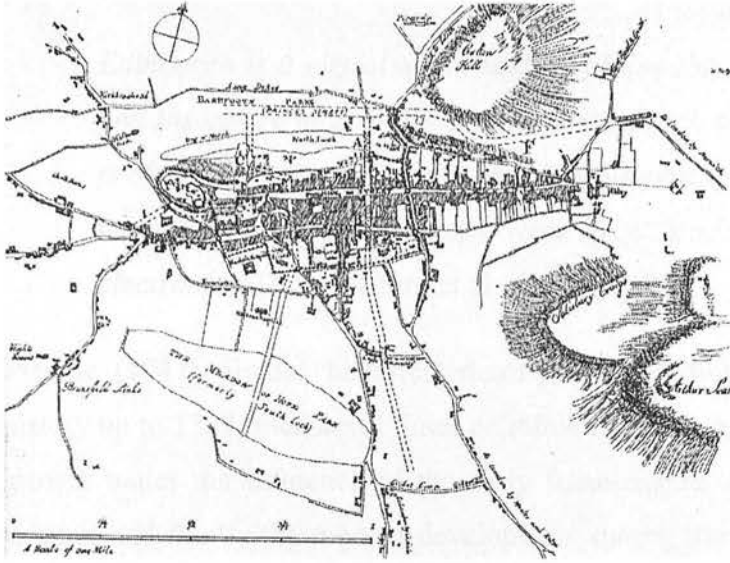
### 6-1-1 Geographical Location (the city and its setting)

Edinburgh, the capital city of Scotland, with half a million population, is located near the north-east coast of Britain in Lothian region (figure 6-1). Its extraordinary geographical location and topography has generated its highly valuable and strategic site. The extinct volcanic plug of the Castle Rock, a readily defensible site, and the epicentre of the city, suggested an ideal starting point for the city. In the early stages of the city growth, the only adjacent site for development was the long ridge, from the Castle to Holyrood. The geographical formation, caused by eastwards-travelling glacier being split by the Castle Rock are depositing a trail of moraine rocks in its wake, is known as *crag and tail*.



**Figure 6-1:**  
Edinburgh location in Britain and in Lothian

The topography of the region consists of rugged hills, ridges and valleys stepping down to the Forth. Prominent round the city are the hills: Arthur's Seat, the highest and most conspicuous, and also Corstorphine, Blackford and Calton Hills (figure 6-2).



**Figure 6-2:**

This map based on one by J. Craig of 1763 shows Edinburgh just before Georgian Expansion. Calton Hill, Arthur's Seat, North Loch and South Loch or Meadows are indicated on the map.

**Source:** Macrae

Three principal, though very small watercourses exist within the city boundaries: the Water of Leith, the Braid Burn and the River Almond. They played little part in the establishment of the city, but were important in the development of the historical villages that today lie within the city boundaries. Today the major contribution of these rivers lies in their special landscape value.

Postglacial lochs played a major part in the form of the city, particularly the Nor' Loch, Gogar Loch, Corstorphine Loch and the Borough Loch (now the Meadows). The Nor' Loch has such been permanently drained, and Princes Street Gardens, the main north and west railway lines from Edinburgh Waverley Station now run through it. On the south side of the city, on the site of what is now the Meadows, was the Loch, which was partly drained in 1658 and wholly by 1740 (figure 6-2).

Edinburgh has developed on and around the Castle Rock; the most important elements in the city's geographical structure that dictated present pattern of the city structure and its major open spaces. The mediaeval city grew along the ridge leading from the Castle Rock to Holyrood, near the foot of Arthur's Seat, and later spread through the valleys between the hills and down the northern slopes to the Forth Estuary (Firth of Forth).

The Old Town and New Town are sited on parallel ridges, separated by the valley of Princes Street Gardens.

## 6-1-2 Political, Social, Cultural, Economic and historical Evolution

*Edinburgh is a city of about half a million, the seat of the Scottish Parliament and the centre of Scottish Government, church and law. Public institutions and professional services are the most visible part of its life-style. Industry tends to be connected with these services (e.g. traditionally in printing, now in electronics) (John Gifford et al., 1991, p. 17).*

Macrae (1947) divides historical description of Edinburgh into five periods: early history up to 1329; mediaeval times culminating in the reformation; the two centuries of growth under the influence of the early Renaissance; 75 years of Georgian classical culture; and finally the modern development during the last 120 years from the spread of mechanised industry up to 1947.

### Edinburgh up to 13<sup>th</sup> century:

Holms (1951) says that the point of origin of the city of Edinburgh was its situation as an appropriate point of concentration for trade and political influence on a Roman Road, which reached the Firth of Forth from the south. Therefore, the twelfth century Edinburgh although small and restricted, must have already had merchants and a kind of burgh organisation.

Mc William (1973) believes that the first inhabitants set up their houses on the summit of the Castle Rock. A second cluster of houses grew out to the east, under the protection of the embryonic Castle and so the nucleus of the town came into being. The Castle Rock was fortified and became the starting point for a linear settlement. Further down the ridge, lived the Canons of Holyrood Abbey, whose mediaeval abbey still stands by the Royal Palace of Holyrood. The principal and contiguous streets of the two burghs were formerly separated by the Netherbow Port (gate). Together they form the Royal Mile of today. According to Markus (1984), the status of royal burgh was granted by David I in 1125 AD. Gifford *et al.* (1991) also argue that David I founded the Royal Burgh of Edinburgh in 1130, and gave leave to the Canons of Holyrood to found their



own Burgh of Canongate in 1140. These new towns were then able attract craftsmen and merchants (figure 6-3).

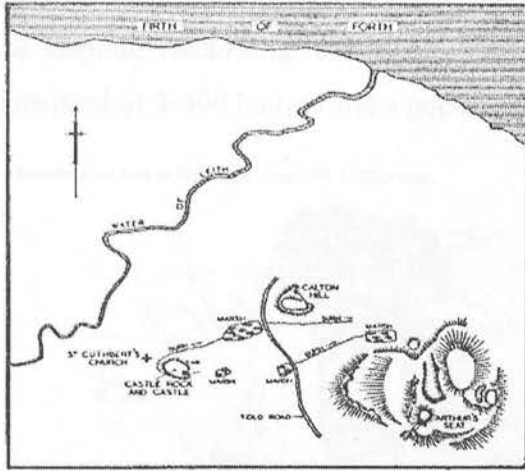


FIG. 2.—Edinburgh and its environs in the 11th century.

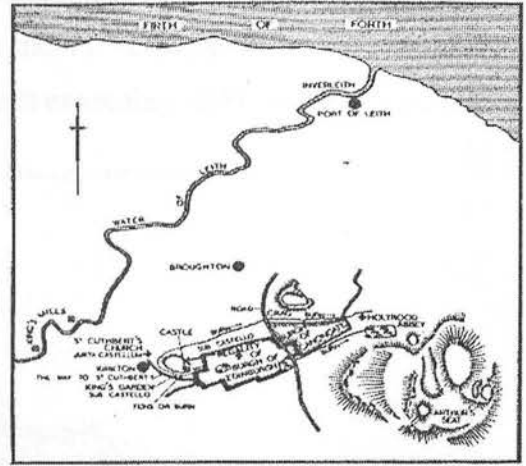


FIG. 3.—Edinburgh and its environs in the 12th century.

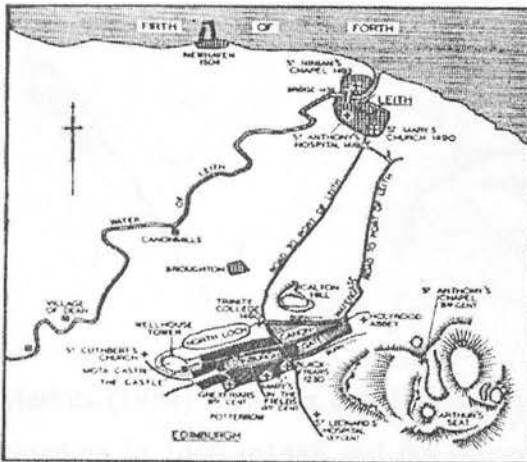


FIG. 4.—Mediaeval Edinburgh, Canongate and Leith.

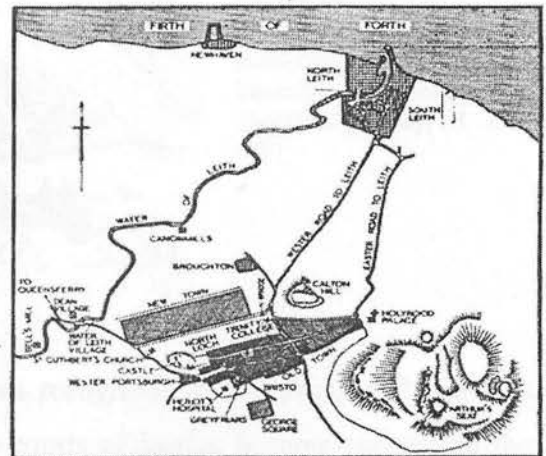


FIG. 5.—Edinburgh and Leith in the later 18th century.

**Figure 6-3: Edinburgh in different stages of its growth**

Source: The city of Edinburgh, A. Holms, 1951

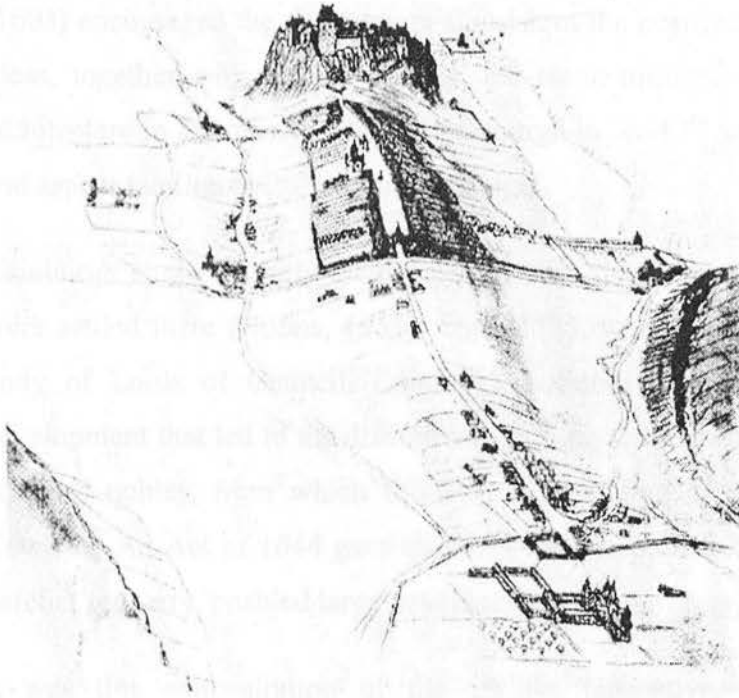
Edinburgh and the Lothians were part of England until 1018. During the most of 13<sup>th</sup> century, Scotland was at peace with England and the burgh of Edinburgh developed rapidly. The English occupied Edinburgh Castle, followed the rise Wallace and Bruce and the liberation of Scotland. Edinburgh's basic structure dates to the 12<sup>th</sup> century (Smith 1996), in which a determining factor was the need for a strong defensive position against English incursion. The early Scottish burgh also retained a rural as well as urban character, linking it directly to the agricultural communities, which it served.

### Edinburgh in Mediaeval Times (1330-1560):

According to Markus (1984), Edinburgh in 1334 was rendered the principal trading centre for the Lothian and the whole of South Scotland. In 1385, Edinburgh was named the Capital. According to Smith (1996) in the 13<sup>th</sup> century the main Scottish burghs consisted of 3-400 houses and a population not exceeding 1000 people (figure 6-4).

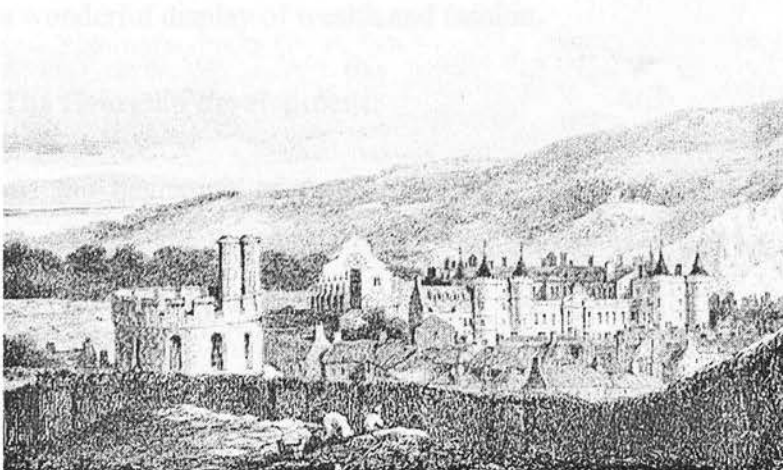
Reconstructed view of Edinburgh, circa 1450. by FC Mears.

Edinburgh District Council.



**Figure 6-4:**  
Reconstructed view of  
Edinburgh, 1450 by Mears.  
**Source:** Edinburgh an  
illustrated history, H. Coutts,  
1981

Markus (1984) indicates that Edinburgh was recognised as the principal burgh of the kingdom in 1460 to 1488 and the supreme courts of justice became centralised there. The building of Holyrood House as a permanent royal residence in 1501 confirmed Edinburgh's position as the capital of Scotland (figure 6-5).



**Figure 6-5:**  
Holyrood Palace  
**Source:**  
A book of Old Edinburgh, E.  
Dunlop and A. Kamm, 1983

**Edinburgh about 1560 to 1750:**

Macrae (1947) says that before 1560, Edinburgh was still a primitive settlement. Markus (1984) reveals that by the end of 16<sup>th</sup> century, Edinburgh had reached pre-eminence as a burgh, economically and judicially, and as the most favoured crown residence. James IV had brought the 16<sup>th</sup> century to an end with a new era of strong government and economic revival. The union of the crowns of England and Scotland (1603) encouraged the economy to flourish in the peaceful climate. The interchange of ideas, together with new prosperity, led to an upsurge of buildings and prestigious architecture in a renaissance style. Edinburgh in the 17<sup>th</sup> century began to take the form and aspect familiar to 20<sup>th</sup> century nostalgia.

Edinburgh could scarcely claim to exist until the administration and courts of justice were settled there (Holms, 1951). From 1535, when the business was transferred to a body of Lords of Council, Edinburgh became its place of meeting. It was this development that led to the difficulty of finding accommodation for offices of state and attended nobles, from which followed the building of residences in Canongate and Cowgate. An Act of 1644 gave the town council powers of compulsory purchase over derelict property, enabled large developments to take place.

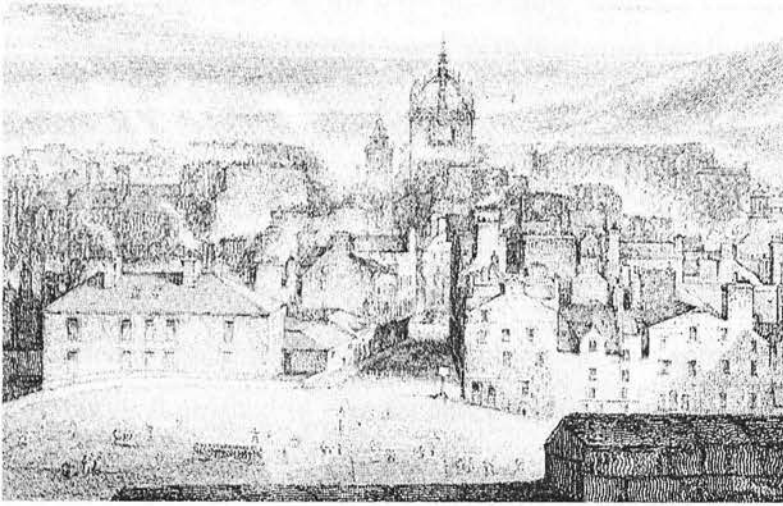
It was this concentration of the various legislative, administrative and judicial departments and their functionaries that was to give Edinburgh its burghal and social pre-eminence, as well as the possibility of self-government. The political movements that convulsed Scotland through the century necessarily affected Edinburgh as the official centre. Some cardinal occurrences however, had their location in the city, such as the tumult in St. Giles, in 1637. For the capital of a poor county; Edinburgh had then a wonderful display of wealth and fashion.

**The Georgian development:**

At the beginning of the George III's reign (1760), Edinburgh was a picturesque, odorous, inconvenient, old-fashioned town, of about seventy thousand inhabitants (Holms, 1951) (figure 6-6).

A proposal of 1752 outlined a scheme for building a New Town, carried out in the following eighty years. The city was enlarged and improved and advanced with public

buildings; people of rank came to live in it and it was constantly visited by strangers; Edinburgh became a centre of learning and the arts.



**Figure 6-6:**  
Old Town from the Castle,  
1825

**Source:**  
A book of Old Edinburgh, E.  
Dunlop and A. Kamm, 1983

From 1763 and later, the Improvement Act of 1827 provided better access to the South and North by building some Bridge and Street. It also considered the urban conditions in the Old Town, which suffered from highly packed population and buildings. The planned First New Town of 1801-2 is the largest development of Georgian Edinburgh.

During the Industrial Revolution, and particularly with the advent of the railways, Edinburgh started to expand, at first along the railways and the industrial land, and later with large houses on the periphery of the city. Markus (1984) believes that Edinburgh itself gradually revived despite economic uncertainties and the removal of parliament to London. The law courts continued to attract power and importance to the city. Its influence spread and the international renown of its leading intellectuals celebrated as one of the leading cultural centres of Europe.

He adds that, between 1801 and 1851, Edinburgh's population grew from 67,000 to 160,000, boosted by immigrants and by expanding upper classes who had come to enjoy the city's prestige as a centre of learning and supported the extensive administrative, commercial and related services. There were also a large and expanding working class finding employment in the railways, road and bridge building.

In social-economic status of the city, Youngson (1966) writes the changes in transport, agriculture and industry caused a great increase in the volume of production of goods and services in the seventy years between 1760 and 1830.

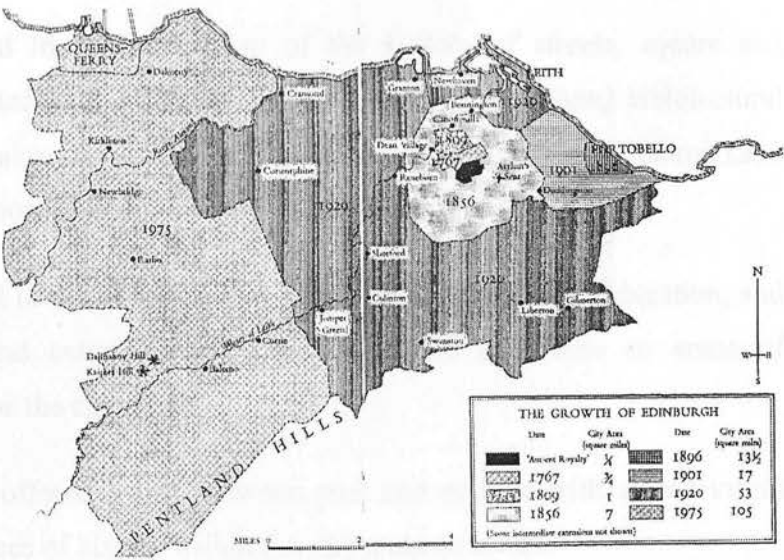
The financial basis of private development formed in Edinburgh and through the banks they also helped to finance the schemes of the town council. There were hundreds of lawyers in Edinburgh in the later eighteenth Century, all working in or near the central law courts of Scotland which were, as they always had been, in Edinburgh.

According to Youngson (1966), everyday social behaviour also changed. Life became more institutional as communities grew larger. The upper ranks of society came together and organised a phase of Edinburgh's social life, from about 1780 to 1826, which was peculiarly flourishing, exclusive and aristocratic. Places of fashionable amusement multiplied without becoming in any sense *common*. The social life of Edinburgh flourished in theatre, concert, supper party, ball and club. After 1775, more *civilised* entertainment were coming into fashion. The concert was becoming a more important item in the social scene. As Edinburgh grew in size and importance, increasing attention had to be paid to the everyday organisation of life. Lawyers, life insurance industry, civil servants and university teachers have made up middle class citizens' activities.

**Modern Development:**

Halford and Association in *The Study for High Building Policy*, argue that, in 1920, the boundaries of the city were considerably extended, After the Second World War Edinburgh continued to expand at a rapid rate. Gifford (1984) refers to the 1930s extensive rebuilding of Canongate, by the Town Council with further rebuilding in 1950 (figure 6-7).

**Figure 6-7:**  
The Growth of  
Edinburgh  
**Source:**  
Edinburgh, the  
story of a city,  
E.F. Catford, 1975





Nowadays, the city of Edinburgh has several key advantages attractive to high technology firms including good communications, the proximity to the airport, being a key element. According to *the Third Statistical Account of Scotland* (1966), approximately 60 percent of the city's working population are employed in service industries. Edinburgh's role as a financial and administrative centre gives employment to large numbers of people in the civil service, banks, insurance companies, and the accountancy and legal professions. Edinburgh has three major universities, excellent teaching hospitals, and the second largest financial centre in Europe after London.

## 6-2 The City Main Structure

This investigation in to the city of Edinburgh aims to establish how the city main structure as a system of transformation, has been operating in the city. The *deep main structure* in Edinburgh is defined as a set of relations and regulations that became manifest in the observable forms of its surface structure. The *city main structure* is taken to see that central area of influence, that works as a generator of energy for the whole city and the source for its stability and transformation. It operates on both *deep* and *surface structural levels*. Edinburgh's deep structure is driven towards transformation by its set of *underlying forces*. The existence of structural properties manifestations on the surface structure are rooted in the complex relationships of deep structural elements of the city. Some of these *structural properties*, which the analysis sets out to observe within the city main structure are:

- Wholeness, manifested in the integration of the system of streets, square and landmarks and supported with a unifying (if not necessarily uniform) architectural style. This property makes the area a *focal point*, a visual network of landmarks, a set of symbolically important and dominant nodal points.
- Dynamism, manifested in the attractiveness of the area for working, education, and commerce, cultural and entertainment activities. These contribute an arena of movement, which keeps the centre alive;
- Self-maintenance has offered a link between past and present with strong visual experience and evidences of history within the city main structure.

- Laws of composition, which provides greater physical compactness and greater density of urban activities, in comparison to other parts of the city. The ways different functions are organised in public places and institutions are visible manifestations of the laws of composition in Edinburgh's city main structure.
- Centrality, in the city emerges in the concentration of public places, human activities, movement, exchange of energy and information. Centrality is also a result of the natural concentration of various institutions of policy and decision-making, which are a major source of transformation within the city main structure.
- Hierarchy, which crystallises a distinct organisation of surface phenomena in the city-wide and nation-wide urban land-uses.

The deep structure of Edinburgh could be recognised through its political situation, economic function, cultural and social life, heritage, administrative centrality and in the variety of urban activities all over the city. The reputation of the city as a centre of art, education and also tourism influences its city deep structure itself inherited from a long history of evolution.

### 6-3 The City Main Structure Transformation

*Human settlements are continually changing* (J. Lang, 1994, p.70).

Structural transformation is a continuous phenomenon and the result of underlying forces. This process is guided by the structural properties. Cities with a long history like Edinburgh provide a rich opportunity to understand the process of structural transformation. A review of transformation in underlying forces gives an idea of how invisible reasons of intrinsic transformation have become presented in the surface structure of the city. This section of this chapter investigates various visible aspects of transformation. As discussed in Part One these forces are: geographical forces, social forces, spatial forces, economic forces, political forces, cultural forces and historical forces.

New look and interpretation of available historical data on the city has been the source of discussions. Selection from an ocean of historical information about events and

urban elements allowed the author to extract valuable nuggets of information to symbolise the concept built on structuralism paradigm to analyse the deep and surface city main structure.

### 6-3-1 Geographical and Environmental Forces

*Yet the imprint of its history remains, on Edinburgh High Street. In its plan and architecture one still can recognise the natural product of the site. The conditions under which the town first took root and grew (Geddie, 1900, p.29).*

Amongst geographical and environmental forces in Edinburgh, topography is the most effective geographical force. Over centuries the topography has influenced the formation and transformation of this city. Landform, the rock and the ridge, the steep slopes, lochs and the valleys on the both sides of the rock have inspired the location of castle on the high dominant and strategic site over the region. This particular topography conditioned and contributed the form and growth of the densely populated medieval city. The gradual growth – the linear form of the Royal Mile - was the result. The ridges lent a unique character to the Old Town, with the valleys were major obstacles to access to the Old Town and also its growth until they were bridged from the 18<sup>th</sup> century onwards. These bridges later became main axes of new growth and lent a totally different character to the Old Town (figure 6-8).



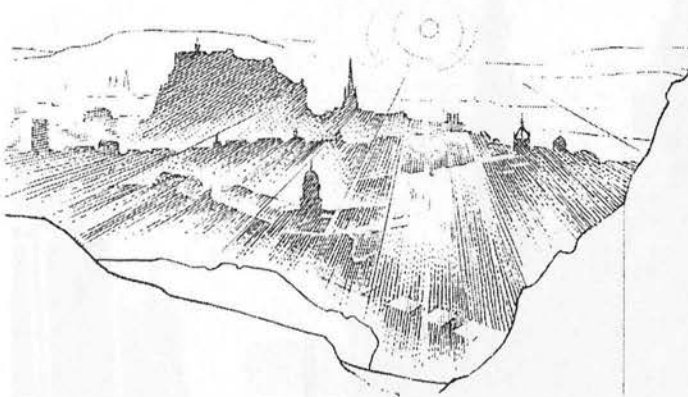
**Figure6-8:**  
The city of Edinburgh from the south by W. Hollar

**Source:**  
Edinburgh in old times, D. Fraser, 1976

*It was a city of refuge and defence, the joint offspring of the castle and the Abbey, which guarded and enclosed it to the east and west as did the marshes on the north and south. The old citizens had perforce to build 'close and high' when their rock left them so little space to build upon (Geddie, 1900, p.29).*

The process of transformation in the city could continue because structural property of homeostasis supported the process from stagnation - a possible situation because of topographic restriction. Geographical and environmental forces ruled by self-maintenance property, which lead the transformation towards opening up new lands and new opportunities for achieving a more complex city structure.

As a visible manifestation of geographical forces, the Scottish capital is now one of the few great cities today to possess natural features within its main structure. Its topography creates dramatic townscapes and opens up wide views out of the centre toward hills within the city as well as views across the centre and into it from far distances (figures, 6-9, 6-10). Calton Hill provides a unique opportunity for the city to terminate the vista of the main shopping avenue of Princes Street, using a series of monuments like William Playfair's, National Monument, a memorial to the Scots soldiers who fell in the Napoleon War (figure 6-11, 6-12).

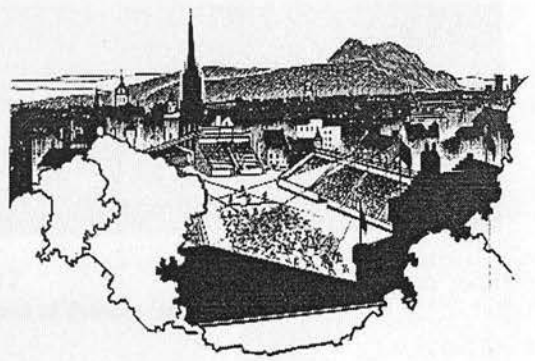
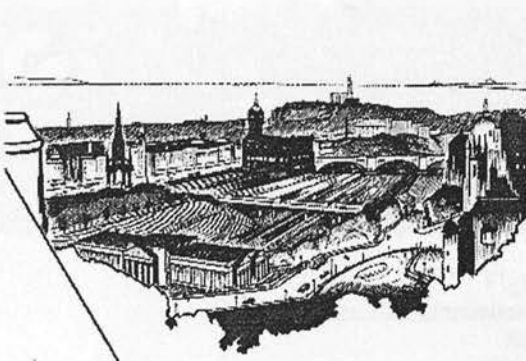


**Figure 6-9**

Edinburgh Townscape from Salisbury Crag

**Source:**

Edinburgh Alphabet, J.F.Birrel, 1980



**Figure 6-10:**

Panoramic views of Edinburgh from the Castle to the east and to the south

**Source:** Edinburgh Alphabet, J.F.Birrel, 1980



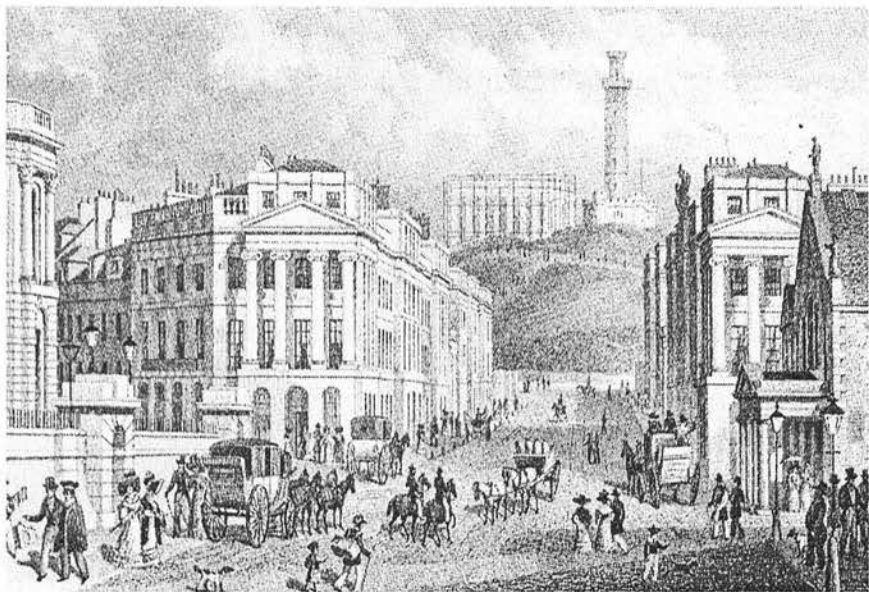


Figure 6-11

Calton Hill, The National Monument and Nelson's Monument from Waterloo Place, published in 1829

Source:

Edinburgh in the 19<sup>th</sup> century, T. Shepherd, 1829, from 2<sup>nd</sup> edition 1969



Figure 6-12

Calton Hill terminates the vista of Princes Street

Source:

The Author



Geographical-environmental forces influences spatial forces, through the property of self-regulation, reflected in the planning policy on high buildings. Since 1968, consideration for the impact on views and the historic skyline has been a central aspect of development control.

The results of the questionnaire demonstrate how much this geographical-environmental force is valuable for people. This should be considered as the major source of the forces that has translated into the spectacular panoramic views within and of the city.

### **6-3-2 Social Forces**

In a city like Edinburgh, social relationships as a set of interests, tensions and situations, has provided dynamism within the public realm. Edinburgh's public places are an arena of a high level of human interaction. This has been a pressure on the city main structure to provide attractions for a broad spectrum of the population through economic and cultural activities. The city main structure's responsibility is to provide the opportunities for this underlying force to be satisfied on the surface structure and social harmony can be maintained. The social history and social transformation of the city is written into the structure of the built-up area and its identifiable surface structure.

From 12 to 13 centuries, when Edinburgh was a burgh with small houses on its High Street, the defensible site of the Castle provided a proper situation for a small-sized community to settle down. The society later developed along the ridge (now the High Street) running down to Holyrood Abbey. By 1500 the High Street, roughly spiriting the 'top half' of today's Royal Mile was fully built up and became the heart of the growing town between the Castle and the Holyrood. The High Street was not only a public thoroughfare; it was also a theatre of civic life; from its first beginnings the heart of Edinburgh has beat in its High Street (Geddie, 1900).

With development of commerce in Edinburgh it came to be separated to two groups of merchants and craftsmen. The wealth of the merchants, which came largely from their overseas trade, made them a privileged and powerful social class. Smith (1996) refers to the goldsmiths of Edinburgh who formed an elite group within the guilds of the hammermen or metalworkers. Coutts (1981) believes that one cause of dissension between merchants and craftsmen was the virtual monopoly of control exercised by the

former group over burgh affairs. In the 16<sup>th</sup> century, while merchants and tradesmen lived on the High Street, the houses of the gentlefolks were obscured in and cramped closes (narrow alleys leading off the High Street). The Cowgate was, for a period, one of the most exclusive streets in Edinburgh, so in the early 16<sup>th</sup> century it was where the nobility and the chief men of the city resided.

A consequence of an increasing population with a bounded settlement was that different social classes lived in the same buildings in the High Street, but on different floors. Smith (1996) explains that in the course of 17<sup>th</sup> century, Edinburgh was to become famous for a vertical form of democratic hierarchy in its residential buildings. With the poorer people in the lower floors, close to the smells and noise of the street, and the richer classes occupying the more airy upper floors, but sharing the same access doors and stairwells. By the late 18<sup>th</sup> century the Old Town of Edinburgh was in decline. Conditions had become intolerably overcrowded and insanitary, so this form of residential neighbouring was breaking down although the ground floor shops (the Luckenbooths') were still in business.

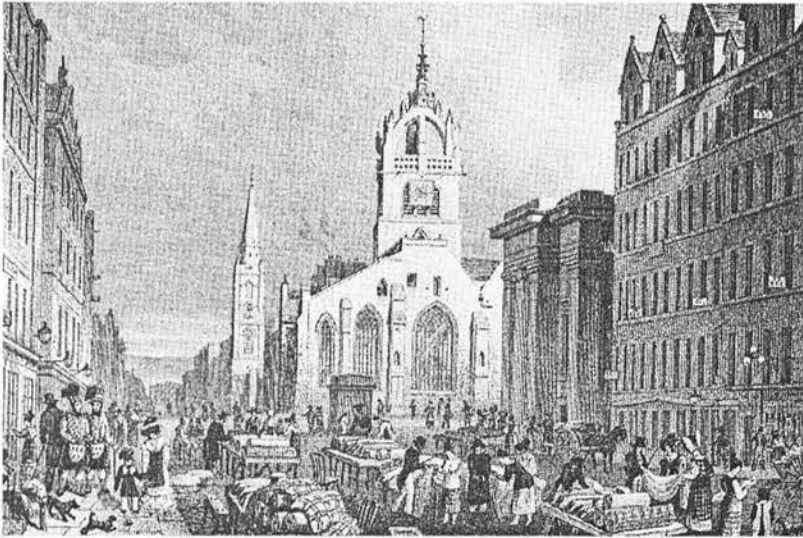
In the Canongate (lower half of today's Royal Mile), the Holyrood officers and Highland chiefs made the White Horse Close their headquarters (figure 6-13). White Horse Inn was for a long time, the departure point of the London Stagecoach, dating from 1623 (Geddie 1900, Minto 1973).



**Figure 6-13:**  
Whitehorse Close at the foot of Canongate from a watercolour by J. Skene  
**Source:**  
Edinburgh, the story of a city, E. F Catford, 1975

Constructing more public places and civic services was a respond to social needs of growing population and urban activities. An important surface structural sign of transformation was the formation of a civic centre of national significance in the High

Street, now known as Parliament Square. The property of centrality stimulated gathering of some main urban public places and urban activities in that square. All major municipal functions like the parliament, civic courts, the cathedral and the tolbooth, by their proximity, reinforced this focal point. All aspects of social life and business grew around the Parliament Square, making it both a civic centre and a centre for trade (figure 6-14). At this place also, the honours of the city of Edinburgh were bestowed upon noteworthy visitors.



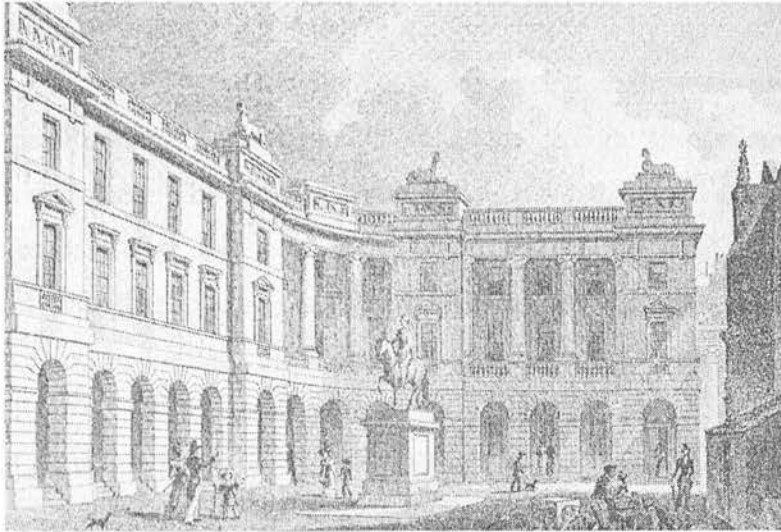
**Figure 6-14:**  
St. Giles' church and  
Lawnmarket

**Source:**  
Edinburgh in the 19th  
century, T. Shepherd,  
1829, from 2<sup>nd</sup> edition  
1969

Parliament Square was enclosed on the north by St. Giles Cathedral and on the south by the law-courts and shops. In Parliament Square, the jewellers and the goldsmiths resided. Trade, shopping, fashion and business became for centuries social life of the High Street. This place was also setting for the Market Cross, which marked Edinburgh's status as a Royal Burgh. First mentioned in 1365, this was where kings and queens were proclaimed and where particularly significant executions took place, its basins were filled with wine when James IV and his queen entered Edinburgh in 1503 (Birrell, 1980) Although a great fire destroyed most of that area in 1674, through the intrinsic structural properties of self-maintenance and centrality, it was quickly re-established as the civic centre. The remaining Parliament Hall and the seat of the Scottish Judiciary dates from the 17<sup>th</sup> century (figure 6-15).

The centrality of this nodal point also reinforced by other public places responding social affairs like the Tolbooth (figure 6-16), which for a period accommodated the meetings of the Scottish Parliament, the Town Council and the Courts of Law (Coutts, 1981). The Luckenbooths and the Tolbooth, lingered in their places until nearly the end

of second decade of the 19<sup>th</sup> century. These buildings which had social importance in the city's annals lined in the one thoroughfare traffic and strategic thoroughfare at that period. Geddie (1900) explains that the Old Tolbooth later degenerated into a prison. An area before it in the Lawnmarket became the place of public execution after 1758. More to the south stood the New Tolbooth which was the scene of historic events, of state trials, meetings of the Estates and ecclesiastical gatherings, before it was given up to the business of the City Fathers.



**Figure 6-15**  
The Parliament House

**Source:**

Edinburgh in the 19th century, T. Shepherd, 1829, from 2<sup>nd</sup> edition 1969



**Figure 6-16**  
The Tolbooth from south west

**Source:**

A book of old Edinburgh, E. Dunlop and A. Kamm, 1983

In this strategic social point of the High Street, Tron corner was the great trysting-place of the Old Town for Hogmanay (the Scottish New Year). Some of the most favoured and famous of the 18<sup>th</sup> century taverns and coffee-houses were in this quarter. The spot



has witnessed feasts over which Royalty presided. The Old Assembly Close recalls memories of dancing assemblies up to 1766, before they departed into the fashionable New Town (Geddie 1900).

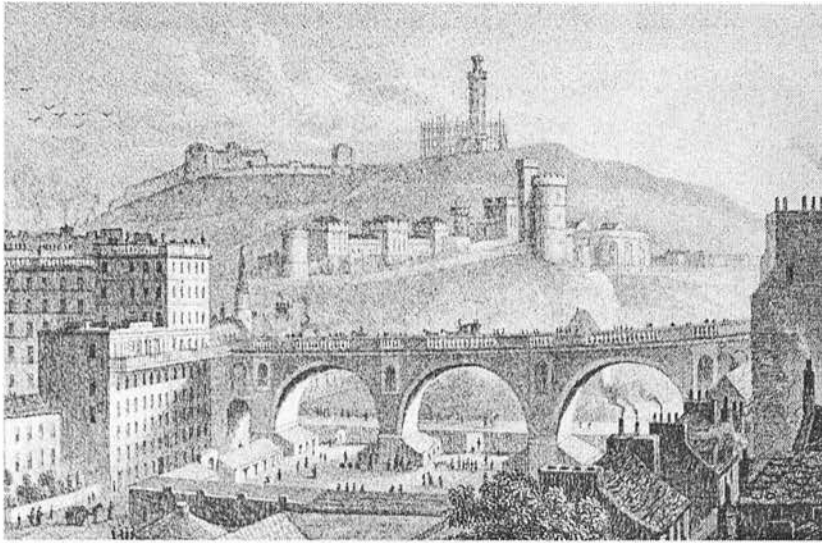
People also organised informal social meetings in chop-house and oyster-cellar. Here also men and women would seek social diversion in clubs of many kinds and for all ranks, some clubs that kept alive traditions and others were devoted to drinking.

Away from the High Street, but connected to it by main routes, new urban institutions formed and new urban elements were erected on the main axis reinforced the process of transformation. Greyfriars Church, the Weigh House and the Meal Market were constructed. The Act of 1644, which gave the town council powers of compulsory purchase over derelict property and enabled large developments to provide more social services take place. The Royal Mile houses built for merchants and for nobles who wanted to be near the court. The dynamism of increasing variety of urban activities added of the city structure complexity. The 17<sup>th</sup> century saw the erection of a number of significant buildings in the city. George Heriot's hospital was set up for the maintenance and education of the orphan sons from a goldsmith's fortune in 1628 (Gifford 1984, Markus 1984, Coutts 1981).

Social forces in Edinburgh were also influenced by its administrative and political situation. Although parliament was not necessarily held in Edinburgh, the presence of the Lords of Session and of the College of Justice contributed materially to the prosperity of the burgh. In such ways, the social forces demand civic services as well as support their establishment.

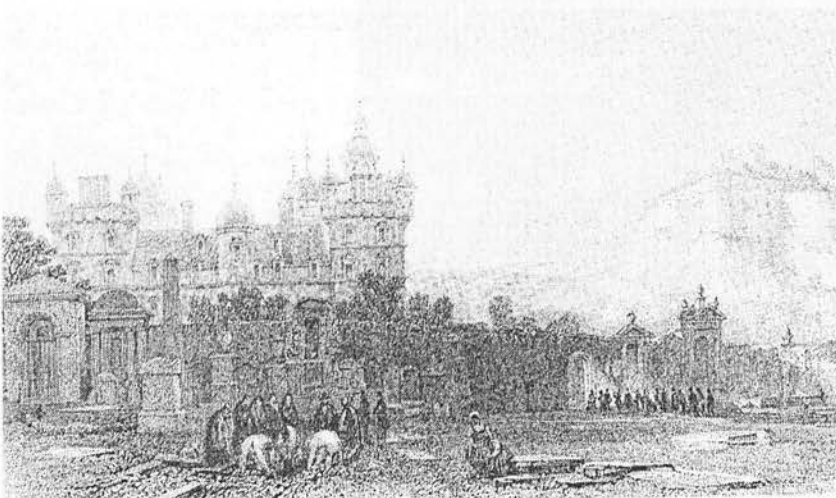
The origin of the modern city's development and structural transformation must be looked for in the second half of the 17<sup>th</sup> century. By that time the capital was thoroughly overcrowded, circumscribed as it was by walls within which all burghers bound to maintain a residence. Its congestion could not be relieved until the valleys to north and south were bridged and the lands beyond them easily accommodated from the centre (figure 6-17). There was no room for any public buildings of importance, such as a capital city in the 17<sup>th</sup> century might be expected to possess; no suitable exchange for merchants, no record office or any adequate meeting place for the magistrates, the town council, and conventions of Royal Burghs.





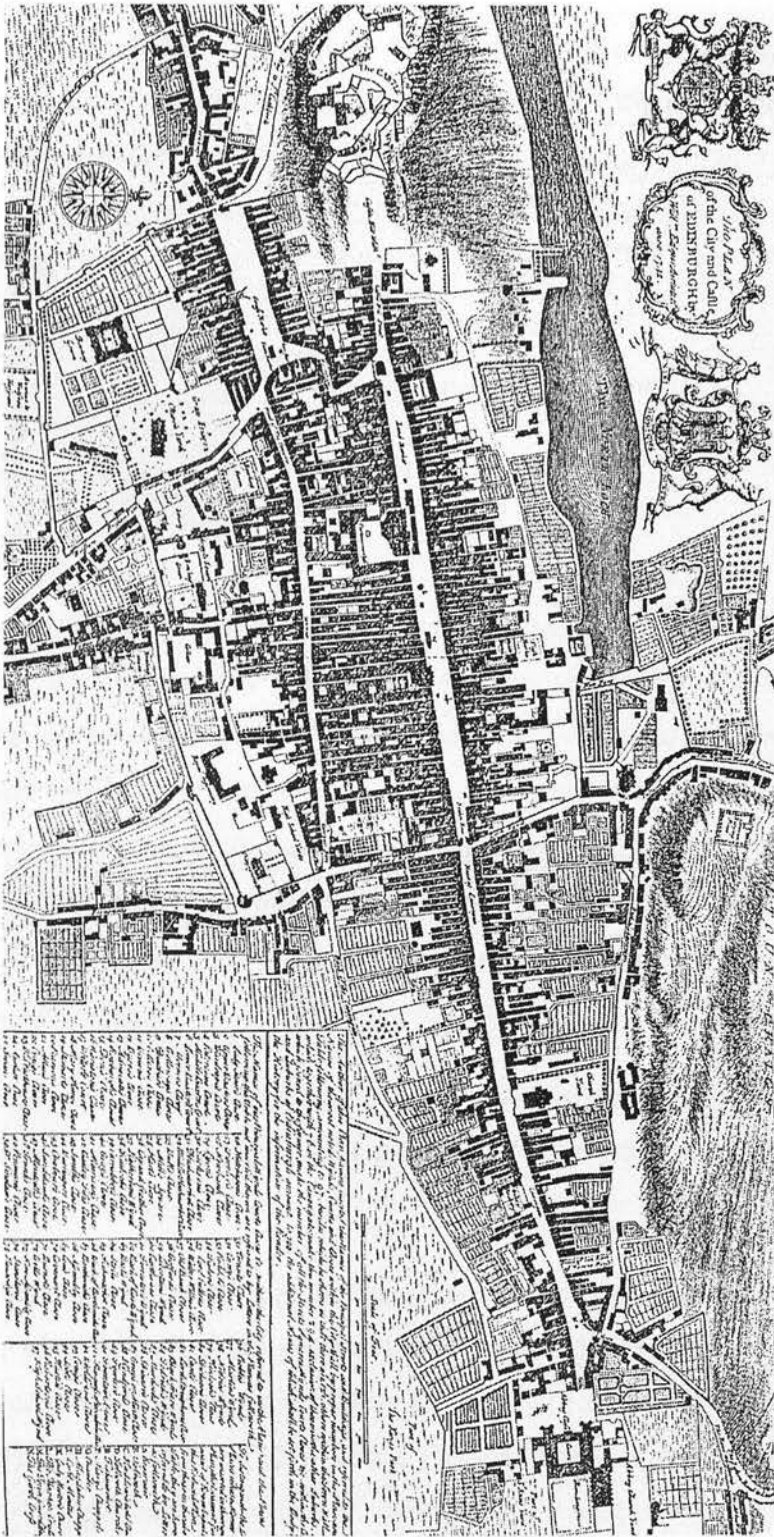
**Figure 6-17:**  
North Bridge and Calton Hill  
**Source:**  
A book of old  
Edinburgh,  
E. Dunlop and A. Kamm,  
1983

The first extensive scheme was started after the great fires (Markus, 1984). The structural transformation needed to reconcile the property of centrality and equilibrium. The centrality concentrated on those public places supported rebuilding the area with some modification and adding new buildings like merchant's exchange. Other physical transformation happened to respond better performance of the city structure. Equilibrium, the need to preserve a liveable social core, save all the aspects of community demands by adding variety of social services, constructed outside the restricted centre, Royal Infirmary, the Orphan Hospital and George Watson's Hospital were built in mid 18<sup>th</sup> century. The Royal Bank and the Friendly Insurance Office began their work in Edinburgh at the same period. These buildings covered different aspects of deep structural underlying forces in the process of structural transformation (Youngson, 1966) (figure 6-18). The present City Chambers was built as an exchange, to get merchants off the streets and relieve congestion.



**Figure 6-18**  
Heriot's Hospital from  
Greyfriars churchyard  
**Source:**  
A book of old  
Edinburgh, E. Dunlop  
and A. Kamm, 1983

In 1745, Edinburgh was still restricted entirely to the narrow ridge (figure 6- 19).



**Figure 6-19:**  
The first plan of the Old Town, executed for the Town Council by W. Edgar in 1742  
**Source:**  
J. Macrae

There was a great increase of the population of the city between 1760 and 1827 (Markus, 1984). Development outside the walls began in the late 17<sup>th</sup> century, when less populated areas (Canongate and South Side) villas were built in and Leith became a

fashionable seaside resort (Gifford, 1984). The poorer people moved to the Grassmarket situated south of the Castle Rock. The Lawnmarket, which takes its name from the corn and grain markets, which were held there for several centuries, was a poor area of boarding houses and inns, tanneries and foundries. Many murders and thieves were hanged in the Grassmarket (figure 6-20).



**Figure 6-20;**  
Grassmarket and the Castle  
**Source:**  
Romantic Edinburgh, J. Geddie, 1900

*Edinburgh remained within its defensive walls until about the middle of the 18<sup>th</sup> century. Though the area of the city remained static for this long period, conditions within the city walls were rapidly changing in two respects, first, in intensity of population and housing and, second, in the re-allocation of the large open area to the south cleared of its religious houses after the reformation. Outside the city wall ribbon development was taking place, on the coaching roads to the south. The medieval city still occupied the Ridge and ran down to the valleys (Macrae, 1947, pp. 8-10).*

In 1752, the first planned expansion beyond the summit of the ridge started towards the Cowgate, south of the High Street, where many public buildings were erected (Holms, 1951).

The New Town was developed as a fashionable place for people of the upper classes to live and work in. Lawyers, who, with the landed aristocracy, formed the backbone of the public, which had wanted and built the original New Town, also became the most prominent citizens of the streets in the Second New Town. Geddie (1900) explains that a long procession of eminent judges and advocates, of learned and illustrious men of science, medicine and philosophy, would stream down the mound and spread through the New Town streets and places, in the when work was over in the Law Courts, the assemblies and the University. The upper strata of the Old Town society, the historic source of wealth and of new ideas, began to gratitude to the new development in the

north, taking many of the Lords of session, city merchants, and philosophers into the New Town. Some older people of philosophy and theology remained for a time on the old ground and in the old ways; fashion lingered long in the Edinburgh closes. But the taste for change had bitten deep, and the opening of the North Bridge was the final signal. The craving for more air and light and space became irresistible and manifested itself in the decade before the founding of the North Bridge and during its years of construction (Geddie, 1900).

The New Town development manifests a structural transformation actively driven by internal motivations and resources. To Macrae (1947) there was no risk of the Old Town being deserted. Although as people of fortune and rank would probably choose to build upon the fine fields to the north and south of the Town, professions and businesses of every kind would still gravitate the neighbourhood of the courts of Justice and other places of public resort. This moment of Edinburgh is a striking example of how the structural property of self-maintenance is able to support equilibrium of the structural transformation in a city despite massive physical expansion and the arrival of a new physical and social order.

A rapid growth in population during 1775-1825, boosted by immigrants and by an expanding upper classes and growing class distinction. The segregation of social classes, was a distinctive feature of 19<sup>th</sup> century in Edinburgh. In that period the high percentage of population were middle classes; like bankers, lawyers, craftsmen and merchants, enjoying the city's prestige as a centre of learning and supporting the extensive administrative, commercial and retailing services. Smith (1996) says that the most important upwardly mobile professional group in burgh society was the lawyers.

One unfortunate result of the development was increasing squalor in the Old Town, as it filled up with working class people finding employment in the new railway, road and bridge building and in the docks. Nor was there any water supply or sewerage. The Old Town was "*delicious in life and architecture and association*" according to John Ruskin, but it was "*one great sewer*". There was an unpleasant juxtaposition of having industry, like print works and abbatairs, until legislation separated them. As late as 1865, there were still over 2000 cows housed in Back Court Byres (Bell, 1984).



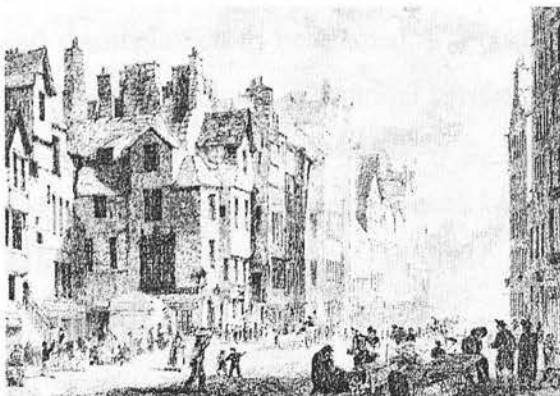
Smith (1996) explains about the rules with the purpose of preserving burgess-ships intact and to prevent the dissipation of property with the subsequent weakening of social status and the economic fabric of the burgh. Religious and the humanitarian motives, however, also played a part and that one of the main activities of the Guilds, which were religious as well as economic organisation, was to care of dependants of deceased members of their crafts.

In the 1760's there were great differences of wealth and clear distribution of rank, but of the physical separation of social groups there was very little. Thus Edinburgh developed as a city of contrasts, of substantial affluence in the new villas of Newington, Brunstfield and the Grange, and of increasing squalor in the Old Town (Bell, 1984).

Legislative and philanthropic responses arose to this situation, when concern for working class conditions increased from around 1815 with the emergence of a new generation of civically conscious whigs and reforming businessmen. In increasing political banquets, upper classes gentlemen talked about trade unionism or the freedom of labour and by 1830, Edinburgh was humming with human progress. Edinburgh was then a new scene of middle class liberation (Bell, 1984).

When the most elevated sections of the community moved to the New Town, their former dwellings were taken over by humbler individuals and subdivided into numerous small flats (Coutts, 1981). According to Smith (1996) the traditions of the burgh and its habitants were breaking down, just as the Old Town itself was losing the broad social structure, which had characterised in pervious centuries.

Public feeling was aroused and the Town Council decided to react. The result was Edinburgh Improvement Act (1867) leading to building fifteen new streets (Smith 1996) (figure 6-21).



**Figure 6-21:**

High street and the head of Canongate

**Source:**

A book of old Edinburgh, E. Dunlop and A. Kamm, 1983

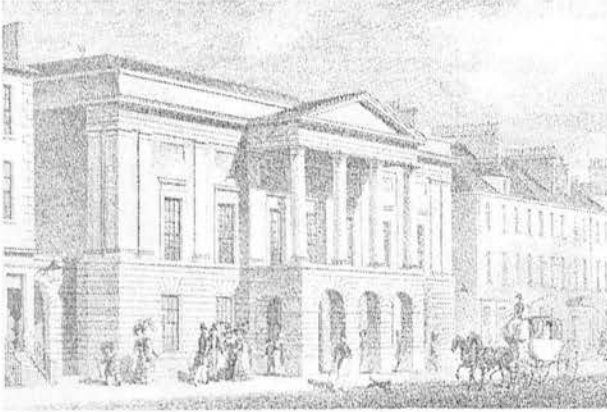


The fundamental problem of controlling development persisted, despite the existence of a more socially conscious burgh administration. In the meantime, some attempt to improve the working class housing problem was made by the church and philanthropists. Bell (1984) concludes that the need to control unplanned housing was a result of middle class awareness. Finally the 1867 Edinburgh Improvement Act opened up areas of slum housing and then private enterprise provided better designed housing, although Patrick Geddes considered the policy of sweeping slum clearance disastrous.

Social degradation in the Edinburgh is a sign of social forces implicit in the making of the New Town. The New Town emerged as a result of a desire to escape the Old Town not only physically but also socially. The building of the more important and more fashionable streets was financed by those who were first to live in them. In the New Town the density of population was far lower than in the Old Town. Here the social forces addressed issues such as housing, environmental improvements, security, and leisure activities associated with places of high quality and amenity.

From the eighteenth century social behaviour also changed. A growing middle class changed some typical celebrations, like the King's birthday to social institutionalised means of communication. More artistic-leisure activities grew alongside gatherings to drink in the Great Hall of Parliament House. So the upper ranks of society came together and organised much of Edinburgh's social life. Places of fashionable amusement multiplied but were open only to people of particular higher levels of social rank.

As Edinburgh grew in size and importance, increasing attention had to be paid to the everyday organisation of life, while the more formal social life of Edinburgh flourished in theatres, concerts, supper parties, balls and clubs, taverns remained the meeting places. Some entertainment like concerts came to fashion and therefore concert halls and theatres need to be erected. The popularity of the theatre was outdistanced by the popularity of dancing. Theatrical performances in Edinburgh, which were began early in the eighteenth century became to be held in former public meeting places like the Assembly Rooms in the High Street, before these moved to the George Street (figure 6-22).

**Figure 6-22:**

Assembly Room, George Street

**Source:**Edinburgh in the 19<sup>th</sup> century, T.H. Shepherd, 1829, 2<sup>nd</sup> edition 1969

Little by little Edinburgh changed to be a centre of art, social activities and learning, as much as one of government and law. Civil servants and university teachers made up the middle class citizenry. The social force attracted power and importance to the city, giving it an international renown of its intellectual of a cultural centre of Europe.

Over these structural transformation, the Old Town as a place to live in had become, by 1880, an appendage to the New Town. But within the New Town itself transformation had started and some areas were already changing their character and some, in a social sense, already going downhill. Princes Street was one of the first to show signs of that social decay which has since overwhelmed it and turned it a ‘shopkeepers’ parade’ (Youngson, 1966), although to a stranger, it offers today an impression of a monumental city.

As social life in the Old Town decreased, the Town Council proposed wholesale slum clearance and the complete demolition of the Lawnmarket area and later the High Street. Appalled at the prospect of losing so much of the medieval city, Patrick Geddes convinced the council to adopt instead a programme of *conservative surgery* involving partial demolition, rehabilitation and rebuilding. The effects of Geddes’ urban planning thought continued into the 20<sup>th</sup> century evolution within the Old Town, exemplified by Macrae’s rebuilding, in the Grassmarket and Canongate, (1920s) of several buildings such as the Last Drop Tavern (Rosenberg & Johnson, 2003) (figure 6-23).

Conservation ideas in the 20<sup>th</sup> century were a consequence of the desire to revive the social fabric of the Old Town. So along with renovations of the original housing in upper floors, many buildings at street level came to be occupied by businesses reinforcing social life, like restaurants and pubs. This was a concerted effort to renovate

the historic fabric and vitality. At the same time some land uses like theatres - Royal Lyceum, the Playhouse, Festival Theatre - and some other art centres were reconstructed to provide places for social as well as cultural integration.



**Figure 6-23:**

The heart of the Royal Mile, 1890

**Source:**

Edinburgh from old photographs, C. Minto, 1973

Transformations during the 1950s and 1960s show some aspects of functional deterioration in the Old Town as a result of the socio-economic condition of the post-war society. The community structure of the Old Town underwent considerable change as many families were decanted to the new housing estates on the perimeter of the city. Many buildings became derelict or changed to be used as storage. Only in the 1970s did rehabilitation become popular again.

The last forty years have seen the widespread development of restaurants, takeaways and public houses, reflecting the Old Town's role in employment, tourism and leisure activities.

The improvement of educational institutions increased the youth population and their social needs, stimulated the boom in leisure activities and public houses. A good example of these kinds of areas is the Grassmarket with its pubs and restaurants.

Nightlife as a form of social activity, is now a predominant aspect of socially dynamic urban regeneration, heavily concentrated in the city main structure and its public spaces. The arterial routes such as Lothian Road, Leith Walk and particularly Princes Street

show a tremendous integration of pedestrian, public and private transport with a multitude of cafes, pubs, restaurants and theatres.

Central Edinburgh has a large residential especially student, population. The dominance of the pub for night-time socialising in Edinburgh is a response to this demographic structure as a social force. The city has over 500 such establishments, and the pub culture plays a large part in social life of the city.

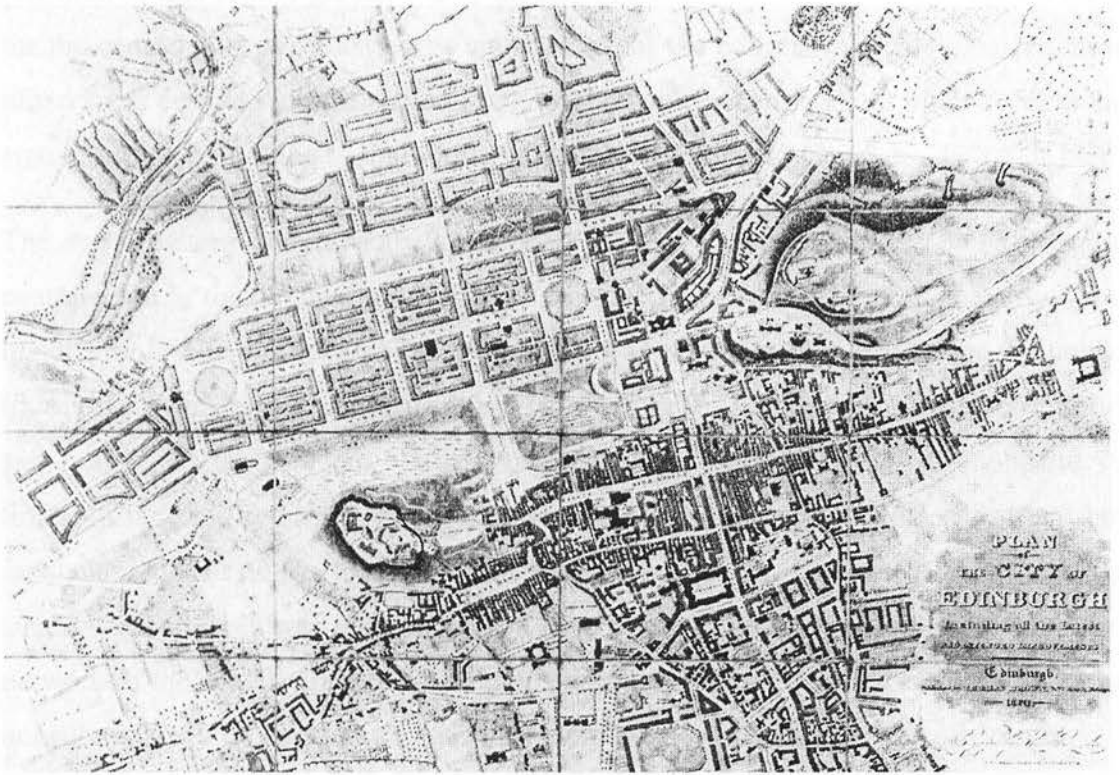
### **6-3-3 Spatial Forces**

Spatial forces are directional forces, which are able to direct the becoming process of a settlement. The forms of the forces could be a point or a line (urban main axis) or a surface (a conservation area either historical or even green areas, like the Meadows) or a volume (a landmark like the Scott Monument). In Edinburgh, memorable vistas should also be considered as spatial forces of exceptional power and quality.

The designing of the New Town is a very good example of how spatial forces have such importance in Edinburgh, not only in its reply to the pressure for more space than could be offered with the Old Town's restricted physical boundaries. Limited lands and spaces resulted a dense pattern of buildings stretching downhill to the north and south of the Royal Mile. As a result of interaction with other forces - social and economic - the spatial barriers collapsed when the city's east gate, demolished to improve the flow of traffic of the Royal Mile and from the 1770's rest of the walls were gradually demolished. Falling down of the walls changed the closed shell-form of the city structure towards formation an open and growing pattern of the city structure. Spatial forces were underlying forces for bridging the valleys to north and south. The draining of the south or Borough Loch had already been in process to form the Meadows. Large-scale expansion with considerable structural transformation - building of the New Town- began along with an era of new roads in the Old Town. The hectic activity of the 1820s anticipated many needs. All these changes were motivated by intrinsic structural properties of the city structure for the journey from its primitive structure to more complex structure to give it better performance.

A clear example of how spatial forces operated in Edinburgh is geometric pattern of the New Town, which is the antithesis of the Old Town with its narrow twisting closes on the backbone of the ridge. In the New Town everything is open and spacious (figure 6-

24). The origin of structural transformation of the New Town is on the surface, a reaction against the Old Town's spatial restriction that in many subtle ways it preserves and even emphasises the deeper qualities of the very unique spatial that result from the buildings and topography to the Old Town.



**Figure 6-24:**

Plan of the Edinburgh Old Town and The New Town, 1820

**Source:**

Edinburgh Princes Street and The New Town

Entire design of the New Town is based on the spatial notion of vistas. First access point - North Bridge – runs axially to the centre of façade of Register House, designed by Robert Adam as a billboard to the New Town in 1744. Charlotte Square, also by Robert Adam, started 1791, is based on the design principle of creating an entire unified vista that binds several properties together. Also, north-south running roads of the New Town (e.g. Castle Street, Frederic Street) all frame points views that give onto the Forth of Firth and Fife beyond. Monuments on the Calton Hill enhance the spatial qualities of the Calton Hill as a natural landmark, and superseded prior plans to build houses upon it. At the heart of design intentions in the New Town was a spatial affection for romantic landscapes and spatial quality.



Some natural historical landscapes of the city like Princes Street Gardens, the Meadows, Calton Hill, Holyrood Park and Arthur Seat act as significant spatial forces for the city main structure as well as assets. Princes Street Gardens from the 1850's signal the Castle from a far distance and frame it with spectacular open public green spaces. The retention of this central garden within the main structure has been always a spatial force for the central part of the city. The significance of the collective will to preserve these urban areas despite their restriction in the way be only accommodates other needs is the sign of the powers of the spatial forces in the mind of the society.

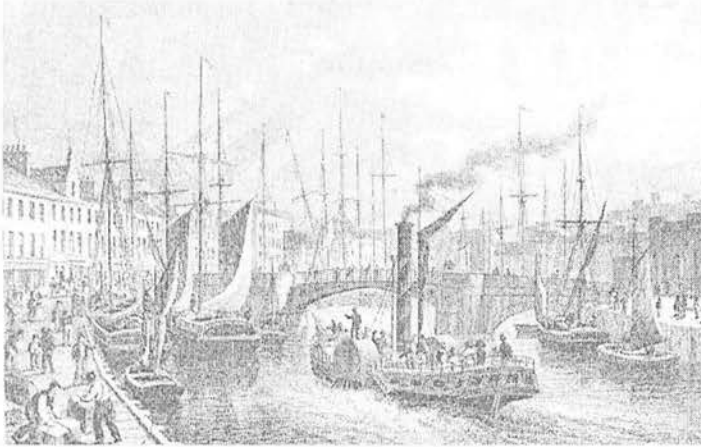
The street pattern and capacity to respond modern transportation particularly in the central parts of the old nucleus of the city work as spatial forces. Traffic congestion is a major problem in central Edinburgh creating a need to improve conditions for public transport and pedestrian movement and car parking in the heart of the city. *Transport* and *parking* as the problem with the city centre are referred in the questionnaire 76 times. In fact, traffic management, which emphasises improvements for pedestrians but recognises the need for local residents and businesses to have reasonable vehicular access to their premises, has become a huge spatial conflict originated in the street network of the central areas. *Less flow of traffic* is a desire expressed in response to the questionnaire 39 times, they also wish for more *pedestrianisation* in their city centre.

### 6-3-4 Economic Forces

Economic forces, through complicated interrelations of production, consumption, exchange and administration determine the urban network, land-use patterns, land price and building density, particularly in the central part of cities. Competition between different groups of activities in inner urban areas is an important economic force. The variety of competing commercial and economic services offers the citizen a great choice and also attracts a wide spectrum of new uses. Another aspect of economic forces relates to accessibility, meaning the best situation for supplying goods and services, and so is often termed (Hillier, 1999) as the movement economy.

Economic forces were associated with transformation of Edinburgh from early stages. The Royal Burgh of Edinburgh status was linked with trade in the 12<sup>th</sup> century. The port of Leith was open to the town, giving its merchants the right to trade through it. A rich agricultural location combined with this to create a healthy market and wealthy city.

The transformation of Edinburgh during the 13<sup>th</sup> century was rooted in improved trading during a period of peace with England, which effected on rapid development of the burgh. Smith (1996) claims that the urban growth involved an increase in trade, particularly overseas trade, a very favourable 'special relationship' with other countries in the 15<sup>th</sup> century (figure 6-25). Foreign trade became more important than local commerce with the burghers enjoying the right to be merchants or craftsmen (Coutts, 1977).



**Figure 6-25:**

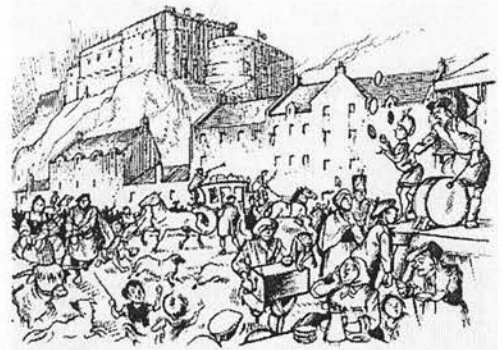
Leith Port

**Source:**

Edinburgh in the 19<sup>th</sup> century,  
T. Shepherd, 1829, from 2<sup>nd</sup> edition  
1969

The right of the burgh to hold markets which dictated the layout of the streets with the provision of at least one open market space. Holding a business conferred social position, access to the trading privileges and monopolies of the burgh, and the right to a voice in the '*community of the burgh*'. As the town grew, this last right was exercised as a vote Council elections (Smith, 1996). The merchants and the craftsmen paid taxes to the court and benefits to the church (Royle, 1982).

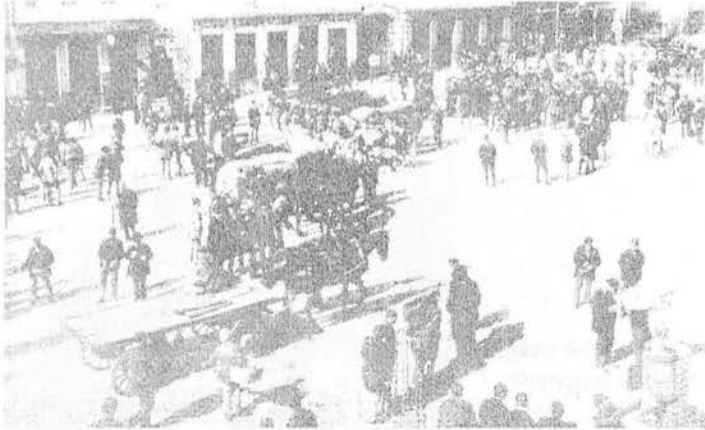
Production and exchange as economic underlying forces also manifested on the surface structure in the form of market places like the Horse Market or the Grassmarket. Goods of all kinds were displayed in the markets at points in the wide High Street, Cowgate and the Grassmarket. Around the West Port, the west of the Grassmarket the Horse Market was established. It was used as a market for the sale of farming products outside the burgh and trades associated by this (Macrae 1947) (figure 6-26).



**Figure: 6-26:**The Grassmarket in its heyday as a fair with the Castle

**Source:** Edinburgh Alphabet, J.F.Birrel, 1980

Geddie (1900) explains that so long ago, as 1477, there was a weekly market for wood and timber in Grassmarket. In 1560 the Corn market shifted there because there was more room for meeting and bargaining, and from that time agriculture centred its movement and interests in the Grassmarket, which still in 1900, presents busy and varied on the weekly horse market days (figure 6-27).



**Figure 6-27:**

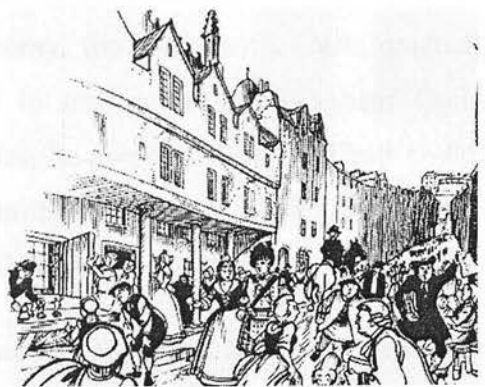
Hours Fair in the Grassmarket, an annual event, about 1890

**Source:**

Edinburgh from old photographs  
C. S. Minto, 1973

Grassmarket was chosen as a locus for the manifestation of economic forces for exchanging farming products because it was the point of arrival and departure for a number of coaches, where traffic between the country and the capital was conducted in the age before steam. Up until the beginning of the 20<sup>th</sup> century it was still the resort of country carters and carriers but the Grassmarket today has lost its regular markets, coming to life only during Saturday market held during the festival month of August. The fortnightly farmers' Market has been pushed to a location further west end the central space of the Grassmarket is often deserted.

In the burgh most houses combined living and working space. The most important trading centre in the High Street was located in Lawnmarket. This place was down the Castlehill and up the High Street where the street was wider. Opposite St. Giles stood the Luckenbooths, locked booths at the street level below the housing tenements, and which contained the city's main shops. This area survived until 1817 when they were demolished. Being near the church was good for business (figure 6-28). According to Smith

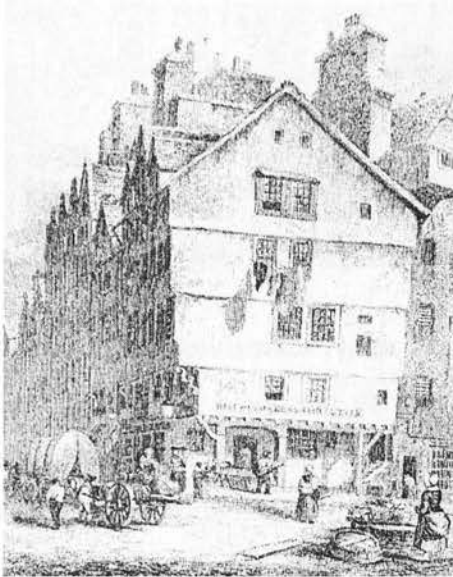


**Figure 6-28: The Luckenbooths**

**Source:** Edinburgh Alphabet, Birrel, 1980

(1996) shops used by craftsmen situated beside the main city gate, and small booths, were a highly valued commercial asset.

Geddie (1900) explains that Lawnmarket occupied by the canvas booths of the merchants in lawn and other woven stuffs from whom it takes its name. Dealers in butter and other farm produce, as well as the sellers of cloth, held their fair in this spacious place (figures 6-14 & 6-29).



**Figure 6-29:**

Lawnmarket and the head of the West Bow from the west  
**Source:**

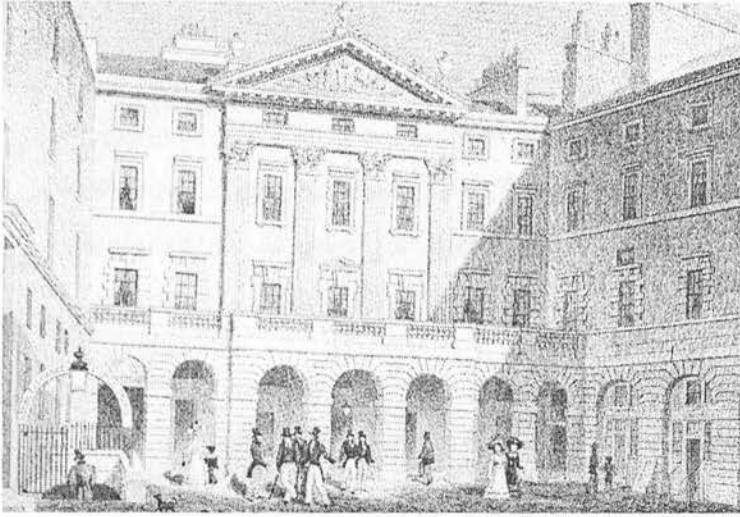
A book of old Edinburgh, E. Dunlop and A. Kamm, 1983

Within the Old Town, various locations of economic activity emerged, such as of Candlemakers Row was. Because of the restricted boundaries of the town, small industries mixed with housing and shops. Printworks, breweries, foundries, the city gas works, slaughterhouses and fleshmarkets, fat melters and skimmers all operated within the Old Town and caused pollution of air quality inside the city until the legislation removed the worst of fenders (Bell, 1984).

As trade was very important in the city's economy, the Merchant's Guild gradually become more important, but the crafts were in incorporations. Merchant Guilds represented the economic elite of society and, despite pressure from the Craft Guilds, retained political control of the Town Council (Smith, 1996). Most of the merchants and nobles' houses were also located on the Royal Mile near the courts.

As a sign of economic importance of trade on surface structure, Merchant's exchange after the great fires located near Parliament Square in the middle of the High Street (figure 6-30). The structural property of hierarchy of the city deep structure, devoted the

highest level of importance to this activity and so the central location within the surface structure.



**Figure 6-30:**

Royal Exchange, High Street

**Source:**

Edinburgh in the 19th century,  
T. Shepherd, 1829, from 2<sup>nd</sup>  
edition, 1969

Although the goldsmiths were craftsmen rather than merchants, they occupied an unusual position by virtue of the exclusivity and the opulence of their trade. The professional exercise and business connections of the Edinburgh goldsmiths were central to the operation of the Royal Mint and the maintenance of the national coinage. To some extent they performed the functions of later banking institutions, later forming a fully independent Craft Guild in 1525 (Smith, 1996). Geddie's explanation (1900) reveals the influence of these economic forces on the surface structure when he writes that, in the High Street, an important centre of business and avenue of traffic, the Goldsmith's Hall and also the Merchants' House were built. The bookshops, until the end of 19<sup>th</sup> century were located on the North Bridge near the Old College.

By 1775, most Scots had started to experience many material benefits. This economic upswing heralded the beginning of an era during which Edinburgh, stripped of its political importance, was to emerge as one of Europe's brightest cultural and intellectual centres. This could be considered as a holistic interaction of all the forces in the transformation of the city.

After the construction of the early New Town, although most of high class citizens withdrew to George Square or to the New Town, they or their servants had still to come to the markets in the Old Town in order to purchase their every day requirements. Lawyers had still to come to Parliament Close, or conduct part of their businesses, in the traditional manner, in convenient taverns in or near the High Street. A lack of



economical activities in the New Town did not last long and, as a sign of economic force after 1800, shops became a familiar sight in the New Town and some legal business began to be conducted there also.

*The New Town completed as residential, tradesmen's houses; shops and small business were neatly tucked into Rose Street and Thistle Street. As a result of commercial pressures in the 19<sup>th</sup> century, the Georgian dwellings were either replaced or adapted for other purposes (The City of Edinburgh Planning Department, 1982, p.1).*

*In 1799, a quarter of century after building began, Princes Street was still very largely a residential street. The first non-residential buildings was people's Hotel and the second the Crown Hotel. A few commercial places like toyshop and dock shop, hairdresser and so on (Youngston, 1966, p.230).*



**Figure 6-31:**  
Princess Street at the foot of the Mound

**Source:**  
Edinburgh from old photographs, C. S. Minto, 1973

By 1840 Princes Street's uniformity had been splintered by the arrival of commerce and clubs (figure 6.31). The studies of The City of Edinburgh Planning Department (1982) show that as a result of commercial pressures in the 19<sup>th</sup> century, the Georgian dwellings of Princes Street were either replaced or adapted for other purposes. There were no overall controls; consequently the replacements were designed as individual units. The result was that Princes Street ceased to have any form of unified design and this lack of cohesion was already being criticised by the 1930's. St. Andrew's Square

tells the same story. Before 1800, it had been one of the most fashionable places to live in all Edinburgh, but later it was occupied by hotels, banks and insurance offices. Charlotte Square, when finished in 18<sup>th</sup> century, were resided individual terraces houses, then after became the haunt of lawyers and doctors.

Growth and transformation in Edinburgh through 1800-1865 progressed within a context of rapid economic development based on industrial, capital and agricultural profits, and also a legal system, which protected private property rights.

Financial buildings like banks and insurance offices began to settle in Edinburgh in the central part of the town from the 18<sup>th</sup> century. This part of economic activities played important role in structural transformation of the city later on. The siting of the Headquarter of the Bank of Scotland on the Mound could be recognised as a consequence of financial developments and banking importance in the city's economy, now manifested on the surface structure of Edinburgh with one of its most prominent landmarks. Geddie (1900) explains that the trace on which stands the Bank of Scotland was occupied by the garden-satires of the citizens who kept their boats on the Nor'Loch, and employed them, on occasion, for recreation.

For transformation to continue in the urban life, a railway line was built in the mid 1830's to connect Edinburgh to Glasgow, it enters Edinburgh via Haymarket and runs through the low-lying ground between Princes Street and the Castle as far east as the North Bridge. A railway station located at the east of Princes Street Gardens quickly changed the physical and functional environment.

The deep structure performance in the Old Town has been always very strong. In the process of functional transformation, the Old Town remained the centre of legal, municipal and church administration and middle classes could rarely avoid daily contact in some form with the supposed moral and social degradation prevalent amongst the expanding labouring population (Bell, 1984).

Serious decline and decay in the 19<sup>th</sup> and early 20<sup>th</sup> centuries Old Town reflect on the position of fragmented ownership in which merchants and lawyers have been replaced by painters, pewterers and spirit dealers. In this period, many people were moved out of the Old Town. Geddie (1900) describes the situation in which the Old Town depopulated and dilapidated and in some parts abandoned. To the eastward of the Old

Town many smoky industries have pitched their camp. Gashouses and breweries now occupy the site of the gardens of the burghers of the Canongate and lower High Street, the place once occupied by the ancient Trinity College Church and its Hospital

The Old Town for long time lacked a commensurate level of private investment. It seemed necessary to provide a high quality built environment appropriate for new development. The quality of city centre life for residents and workers was essential to create a more attractive place for investors. This insight resulted in a new burst of self-maintaining in the structural transformation, provoked by economic forces. On the surface structure, commercial redevelopment in the late 19<sup>th</sup> and early 20<sup>th</sup> centuries established the present-day commercial character and introduced a new scale and greater variety of functions, increasing centrality for this part of the city centre. In the early post war decades the Edinburgh Corporation renovated the residential fabric of the Old Town.

A comparable period of intense renewal took place in the late 1970s, to achieve modernisation, expansion of the shopping area and clearance of the remaining concentration of housing in St. James Square and Leith Street and its replacement with the St. James Centre. In this era banks, insurance offices and building societies, department stores, smaller specialist shops and restaurants were established in the New Town. Rose Street became a new focus of life in the area, with its pubs, cafes and boutiques.

According to the Central Edinburgh Local Plan (1994) the official and shopping function of the First New Town was gradually reinforced. This functional transformation was a result of economic forces and deep structural dynamism. Charlotte Square houses changed to well-established professional firms and official residence of the Secretary of State for Scotland, The Scottish Arts Council, Trust for Scotland has been established. Head Office of the Royal Bank also in St. Andrew Square and Register House are distinguished examples. These manifestations of functional changes, are examples of the process of invasion and succession, evoked by the power of centrality of the city main structure within the whole city structure.

In accordance with the deep structural dynamism, the surface borders of the city main structure stretched from both sides of Princess Street. In the East End, monumental

Waterloo Place resided a Civil Servants' area today with hotels and pubs. St. James Square was demolished for building a shopping centre and office development in 1966. Much of this area is now intensively commercial. The West End edges also accepted some functional changes, dominant land uses are shopping and offices.

The Local Plan seeks to sustain the East End area as the major shopping and business centre for the city whilst allowing the inclusion of hotels, restaurants and other uses, with this aim that these functions will contribute to city centre vitality.

Strategic guidance in the 1985 Structure Plan promoted office uses in the city centre, West Central Edinburgh (Lothian Road, Haymarket) as a growth centre for financial offices, market and to sustain manufacturing industry in the inner suburbs (figures 6-32 a, b).

**Figures 6-32 a & b:**  
New office development in Lothian Road  
**Source:**  
The author



The draft Structure Plan Review (1993) supports the city centre as the main location for new office development, other offices in a limited number of locations, at South Gyle and Leith. These areas are identified in Structure Plan as Strategic Business Centre. Local Plan objective is to maintain the city centre as a major focus of business activity and services in Lothian.

Although the Planning Authority in Edinburgh is trying to retain a strong residential use in some parts of the New Town, properties have been turned into offices; much of the Moray Place development of 1822 has changed from residential to office use.

*In addition to office development the Council seeks to retain and encourage a wide range of other employment opportunity, including small workshops for industrial use. Proposals for new small-scale industrial development will be acceptable within the mixed activity zone (Central Edinburgh Local Plan, Edinburgh Council, 1994).*

Accordance to Central Edinburgh Local Plan (Edinburgh Council, 1994), office floor space within the central Edinburgh is approximately one million square meters, 57% of the city's total.

The economic potential of the Old Town role in Edinburgh deep structure has remained considerable through every stage of its transformation process; it has never become devoid of its economic activities and values. According to the Action Plan for Edinburgh Old Town (1996-7) within the Old Town there are over 400 businesses, providing about 12,000 jobs, primarily in the service sector, administration, distribution, retail or catering. The area is still attractive enough to encourage small enterprises to the area to promote the Old Town because domination of the Old Town's economy by large firms is of less economic benefit to local services and also disturbs the traditionally rich mixture of uses.

The reality behind increasing centrality of the city main structure and functional transformation is that many government administrative functions are still located in the Old Town as well as other national institutions such as the universities and libraries. These functions have a profound role in reinforcing the intrinsic power of this area in its urban life and structural transformation.



Smith (1996) refers to the appeal of the history, which combined, with the new phenomenon of leisure for both the middle and working class anticipated the 20<sup>th</sup> century destiny of the High Street as a tourist location. The irony is that the late Victorian cult of Scottish heritage overlapped with drastic improvements in the Old Town which swept away many of the older buildings and even whole streets, leaving a few isolated remnants from the medieval burgh. 1989 brought another era of change in Edinburgh's Old Town as a concerted effort to renovate the historic fabric and bring people back to the area began, a beleaguered tourism sector came to depend on Scottish heritage.

The main stream of functional transformation has sought major expanding use in tourism and the area is heavily used during the Edinburgh Festival. In 1947 Edinburgh held its first International Festival, an event that achieved worldwide acclaim. Since then the Festival has contributed largely to Edinburgh's central area functions and land uses. The International Festival, now including the Fringe and Tattoo, is now a major part of the city's economy. It is considered a significant potential for growth and job creation besides its contribution to the culture and reputation of the city. The direct influence is on leisure activity and tourism, which has increased dramatically in the course several decades. Recognising the importance of a planned expansion of the tourist industry in Scotland capital as a conference and festival centre, affected on functional laws of composition as a way to safeguard existing tourist assets and improve facilities for visitors. As a visible demonstration, there has been a major hotel-development in the whole central area. Several current major projects in Edinburgh are set to realise the vision that increasing tourism provides the sound economic base that Edinburgh needs and, indeed this economic vision has worked as a major economic force in Edinburgh main structure changes. According to Central Edinburgh Local Plan (Edinburgh Council, 1994), in 1992 there were 1.92 million visitors to the city, 48% from overseas, with an estimated contribution to its economy of £338 million. Extended opening hours of shops and tourist attractions and special events in evening is considered important to encourage visitors to increase time spent in the Old Town, that this insight influences the land use pattern of the old part of the city main structure is inevitable (figures 6-33 to 6-35). An increasing number of pubs/cafes are now concentrated along the Royal Mile and along the main pedestrian routes off the Royal Mile and in the Grassmarket. Over the last few decades there has been a steady loss of

industrial and commercial land to other uses, such as housing and retailing, within the Old Town.



**Figure 6-33:**  
Edinburgh High Street in Festival time  
**Source:**  
The author



**Figure 6-34:**  
Edinburgh High Street in Festival time  
**Source:**  
The author



**Figure 6-35**  
The Mound in Festival time  
**Source:**  
The author

During the last ten years, the Old Town has demonstrated its worth as a touristic fashionable and lively part of the city, as a location for business, as a centre for civic, institutional and cultural activities, and as a place to live or to visit. Balancing these different activities and rich in a mix of uses was a planning objective to provide structural stability based upon variety of choices.

In the Old Town support has been given to the development or the conversion of existing buildings particularly, and in mixed-use developments, the provision of space for craft workshops, studios and small manufacturing enterprises along with restricted opportunities for the development of major new offices. For many businesses a city centre location has become less imperative. Since the 1950s although several large new public office blocks have been built but many other offices are situated within old tenements. Twenty five per cent of people working in the Old Town are involved in government administration (Markus, 1984).

In Edinburgh Old Town the functional changes motivated by economic force, now faces two potentially conflicting futures: either it will become yet more tourist-oriented or it could be developed as a well-balanced city centre where community and conservation go hand in hand. Several current major projects are set to realise the former vision of increasing tourism for the city like more accessibility to tourists, new museum and new hotels.

The development agenda of the city for the 1990s, included development of the Royal Mile, and large-scale office development on the city centre, together with controlled expansion of out-of-town shopping centres. As a reflection of economic demands on the surface structure, the 1985 Structure Plan promoted office development in West Central Edinburgh, in Lothian Road and Morriston Street where a number of new office buildings as well as Conference Centre, Hotels, and even housing erected. These developments completed by 1990s played important role in the functional transformation, regarding strengthening of the official and financial functions.

The plan of West Central Edinburgh seeks to create a new focus of business activity, which influences the surface structure by extending the city's business core to the south. The plan emphasises the importance of mixed-use developments to create lively and varied public environments. The economic significance of the site is derived from its

location on the edge of the expanding business district benefited from its adjacency to the convergence of rail and bus routes at Haymarket. To expand business activity at the western *gateway* to the city is a potential for functional transformation, which balances the pressure on the central part of the main structure with meeting the city's economic needs for modern office accommodation. This functional transformation centralised on the new conference centre which is a catalyst of the city deep structure because the significance of the new Edinburgh Conference Centre and Exhibition Centre, is the start of a new phase it marks in the commercial career with national importance.

Waverly Station area is surrounded by a mixture of city centre activities, including the shopping core to the north and a cultural district to the south. Reorganisation of the activities on this part enhances Waverly's function as a main line railway station, as a focus of commuter movements and for visitors.

Shopping activity is important to the city's economy. More than half of this is based in central Edinburgh. The concentration of shopping in centres provides consumers with choice, competition and accessibility, and has become a focus to city life, acting as the location of many other services.

The most functional changes happening recently are out-of-town shopping centres. This pattern of development is not genuine to the process of transformation of Edinburgh for it shows an unbalanced pressure of economy to the structure of the city. In spite of investments is made in the city centre to expand shopping facilities, the importance of the central shopping area is being reduced. Traffic congestion reduces the accessibility of the city centre and so its economic popularity. The questionnaire found that now Gyle shopping centre is the second most popular place for people to go shopping (63%), but the major reasons thus mentioned was its *convenient access* and *easy parking*.

Shopping schemes such as Cameron Toll to the south side and Gyle on the western outskirts of Edinburgh have inevitably drained away some of Princes Street's business. In the past few years, five major retail warehouse parks have opened in *off centre* location. These centres, although, are not a part of the city main structure but a manifestation of an imbalance in deep structural forces. The author believes that these will, eventually succumb to the structural property of self-regulation.

Leisure activities and tourism have increased dramatically in the course of several decades (Central Edinburgh Local Plan, 1994). They are now a major part of the city's economy, with significant potential for further growth and job creation. The widening range of entertainment and cultural facilities and visitor attractions in recent decades has significantly expanded the role of leisure in the functional transformation of the main structure of Edinburgh. The visible signs of these underlying forces can be seen in the Festival Theatre and a new Museum of Scotland.

In this regard, a co-ordinated development strategy is contributing to the creation of a major new visitor attraction. The Dynamic Earth Centre, on the south side, beside Holyrood Road, together with compatible uses (retail, leisure, small businesses, and hotel), is hoped to create an area of vitality and interest, and of cultural and economic importance. Leisure and tourism is thus integrated to the restoration of individual buildings, to the revitalisation of wider areas.

The mixed land use of central Edinburgh is a direct result of the fact that the more diverse an area becomes, the more successful and economically stable it may be. The primary uses give rise to surrounding secondary uses, for example pubs and restaurants gravitate into highly active shopping and business areas and, in the case of Edinburgh in areas of educational activities as well. For this to happen, access from all parts of the city is of great importance.

According to Central Edinburgh Local Plan (Edinburgh Council, 1994) Edinburgh's economy had undergone significant changes in recent years, changes that reflect those that have taken place in the economy of the country as a whole. These changes have had a major effect on changing nature and distribution of employment in central Edinburgh and the development pressures it is experiencing.

To summarise, conservation in the Old and New Town shaped by all-powerful economic forces, has not been a matter of preservation of historic buildings, but the impetus to reconstruct and revitalise an environment, which had been declining physically, socially and economically, since the turn of the century. Within this progress, however, various kinds of economic development could not be considered as intrinsic transformations. Conservation finance is supplemented by different types of finance, housing promotion and tourism. The city through different planning projects, is



trying to balance economic forces with other kind of underlying forces of its main structure to create an integrated living and working environment within the preserved architectural and historic heritage. Because of the nature of problem of reversing social and economic decline in the Old Town providing a wider range of financial sources has been essential to the city main structure's survival and development.

Markus (1984) claims that the importance of industry to the city of Edinburgh is often eclipsed by the arts, law and administration. In 1962 over half of the working population was in industrial employment, i.e. printing manufacturing, construction, public utilities and transport, the traditional historic view of the '*non-industrial*' city was called to question. By 1981 however, non-industrial activities accounted for 76% of the working population.

The few industries operating today in the Old Town still have the advantages of the central location; proximity to financial, administration, legal, educational and medical centres, proximity to rail, bus, air, sea and road transport systems, gas, water and electricity supplies, a large labour supply within a short travelling, and proximity to existing local retail outlets. The economic advantages of the aforementioned are offset by high land values, rates and rents, the stringent planning and environmental regulations imposed within a conservation area and restricted parking. A number of new businesses in the Old Town city centre suggest that the area is still attractive to certain types of industry particularly small craft concerns. Of the new business started in the area since 1976, the majority are in the crafts field.

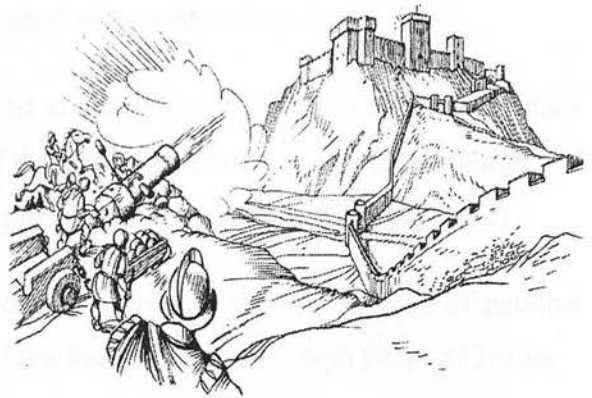
Economic forces in the deep structure of Edinburgh are benefiting from the central location. The vitality of city structure is based on specific and sometimes unique land-uses, and their influences on the high concentration of activities and people's presence within the main structure. To respond to the structural performance and to keep the liveliness of the area, transformation and modification of the activities is necessary according to the society's changing needs.

High technology and knowledge-based industry, financial services, tourism and leisure and retailing could be identified as the newest sectors with most growth potential as economic forces in the main structure of Edinburgh.

### 6-3-5 Political Forces

Defence has historically been an important aspect of political forces, leading towns to grow up around earlier castles or citadels (figure 6-36). Many of the huge urban complexes all over the world are the result of political powers which have access to main financial sources and consequently are able to conduct the process of change in the city. The power for various kinds of administrative land uses to occupy the most appropriate sites within the main structure territory is another examples.

**Figure 6-36:**  
One of the attacks on Edinburgh Castle,  
16<sup>th</sup> century  
**Source:**  
Edinburgh Alphabet, J. F. Birrel, 1980



The first nucleus of Edinburgh in the form of a castle manifests political importance in the city as a king's burgh in 1130. The strong centrality of the castle played important role in formation of the city structure. It is still roughly the geographical centre of the extended city. The burgh of Canongate formed another centre of life and activity within the region. The Canongate and Holyrood Palace were other symbols of political power in the early stages of the city life. Thus in the first stages, the surface structure based on political force was formed by two poles, with a long ridge as the connecting axis. The underlying political forces autonomous centre of power prevented them from merging for several hundred years until the 17<sup>th</sup> century, by which time other underlying social and economic forces overwhelmed this political separation.

Geddie (1900) makes an analogy between the physical form of the city and human body, but it implicit the deep structure of the burgh as well. He writes that access from the city to the citadel makes a great figure in local history. It is the neck, which unites the trunk of Old Edinburgh - the High Street - with its head, the Castle, from the days when Edinburgh Castle was a royal residence and Parliament met on the summit of the Rock. The 'Great Hall' of the Castle, the scene of so many State ceremonials, festivals, and debates.

While Scotland was at peace with England during the 13<sup>th</sup> century, the burgh of Edinburgh developed rapidly. The centralisation of the national administration in Edinburgh determined the character of the burgh (Holms, 1951). The setting of parliament in the city followed by the erection of a royal Palace at Holyrood, the presence of executive departments, and of the Supreme Court of Justice left a noteworthy impact on the formation the main focal point of Edinburgh's surface structure, transforming the town into a centre of political power and a capital city. If the city was not the seat of government, the author proposes that it might never have become the centre of law, luxury, art and social-economic activities.

Between those two central points of interest and commerce stood the Tolbooth, which was built in 1561 as the meeting place of the parliament when it sat in Edinburgh and also as the chambers of the Privy Council and the College of Justice (Royle, 1982).

Geddie (1900) states that Councils of barons have met in St. Giles in time of national danger; it was given shelter to the Estate of the Realm and to the High Court of Justice.

First parliament held in the New Parliament House in 1633 (figure 6-37).

**Figure 6-37:**  
Parliament Hall in Edinburgh  
**Source:**  
Edinburgh Alphabet, J. F. Birrel, 1980

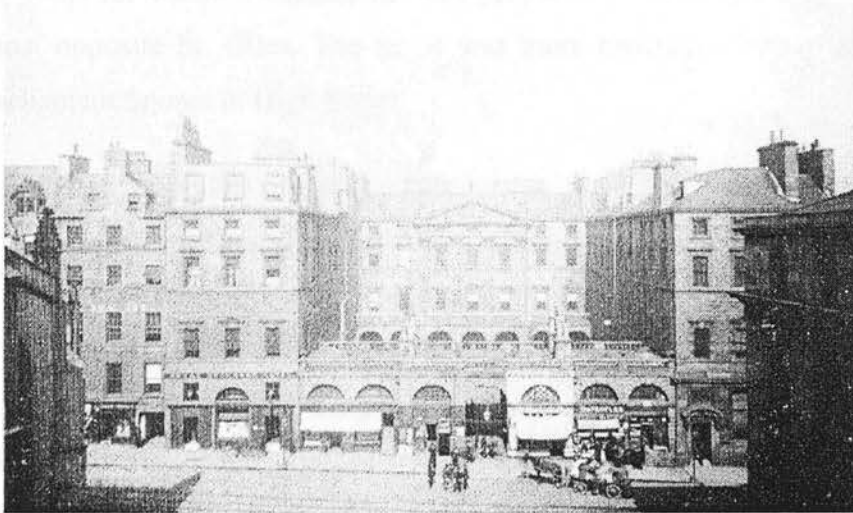


By the middle of the fifteenth century the concern was growing at the danger of invasion from England, so according to the self-maintaining structural property, given a new impetus by this political force, the King's Wall, the first Edinburgh city wall, was built allowing the citizens of Edinburgh to relax in the security of their fortified city (Royle 1982). Self-government as a royal burgh became an outstanding characteristic of Edinburgh. The power that the king devolved to the Town Council even allowed them to allot the markets to specific quarters in the city. Edinburgh was governed by a Town Council of thirty- three merchants and tradesmen, who had discretion on pubic affairs.

Amongst the fourteen incorporated trades were surgeons, goldsmiths, skimmers, tailors (Shepherd, 1969).

Central administrative functions and courts of justice were settled in Edinburgh manifest its deep structure. Appeal-courts of justice, parliaments, and General Councils had sat in Edinburgh at the beginning of the 15<sup>th</sup> century, when the business was transferred to the Lords of Council. It was this concentration of the various legislative, administrative, and judicial departments that gave Edinburgh its political and social importance.

Minto (1973) explains that the City Chambers became the seat of city government in 1811. Such was the political importance of the City Council that it could force the shops in the arches and within its quadrangle to be swept away in the beginning of 20<sup>th</sup> century (figure 6-38).



**Figure 6-38:**

The City Chambers, the seat of government from 1811. The shops in the arches and within the quadrangle were swept away shortly after this photograph was taken in 1900.

**Source:**

Edinburgh from old photographs, C. S. Minto, 1973

The rule of James IV had brought the 16<sup>th</sup> century to an end with a new era of strong government, allowing unparalleled peace and economic revival. The union of the crowns of England and Scotland (1603) encouraged the long battered economy to review and flourish in the peaceful climate and new trading freedom. The interchange of ideas and influences, together with new prosperity, led to the upsurge of prestigious buildings in the renaissance style (Markus, 1984).

The Act of 1644 gave the town council the political leverage of compulsory purchase over derelict property, enabling large developments to take place. One of the outcomes was a New Town built by political power of the Town Council.

To Coutts (1981), important political change in the city resulted from the parliamentary reforms of 1832, followed in the next year by the Burgh Reform Act. This swept away the old municipal constitution of Edinburgh and replaced it by a system of election. The Town Council became for the first time a democratically elected body, although the Reform Town Council had inherited a bankrupted city.

Extension of the city to the north with a connecting bridge across the valley was new breath for surface structural transformation done by the support of the political power and its decision-making system. It was manifestation of political forces on surface structure when the plans for a large hall for annual meeting of the conventions of Royal Burgh and plans for Council Chambers were prepared on the north side of the High Street almost opposite St. Giles. The result was more centrality formed in the nodal point of Parliament Square in High Street.

The deep structural properties of the city based on political power made the mutation in the structural transformation that was the building of the New Town possible. Compulsory purchases brought the greater part of the New Town site into the city's hand (Gifford, 1984). Both in its layout and its street names the First New Town celebrated the idea of the United Kingdom under George III. The original competition winning design for its layout provided by James Craig showed streets laid out in the pattern of the 'Union Jack', the flag that combined the '+' of England's St. George with the 'x' of Scotland's St. Andrew's Cross. The name of the flag, 'Union Jack' refers to Jacobus, the Latinised version of James, referring to King James, first monarch of the United Kingdom. This plan was changed for political reasons.

The nature of the political forces has changed through the centuries. In recent decades they reside in the form of the Town Council and the plans and decisions made by the committees. In 1943 an Advisory Committee on City Development was set up. Its responsibility was preservation and planning control in the New Town. In a wider political and economic restructuring of the early 1980s, Edinburgh's Capital Chamber of Commerce changed town planning from statutory regulation into the promotion of



development and marketing, with the Director of Building Control changes with enforcing structural and safety standards.

A very important functional latter-day surface transformation on the basis of city deep structure political forces is currently taking shape in the Holyrood area, a site within the Old Town Conservation Area. The possibility for major changes were provided because a hospital had closed and a brewery had transferred most of its office staff to other sites in the city. Erecting New Scottish Parliament on the site near the Holyrood Palace and Canongate is an important phase in functional transformation of the city structure. This new urban complex is politically and officially strong enough to absorb new urban functions to the area, and is most likely to have major repercussions on the local functional arrangement as well as on the whole city deep structural performance and its functions.

### **6-3-6 Cultural forces**

Cultural forces in the early stages of Edinburgh structural transformation were based on religious forces. According to John Gifford et al. (1991), the foundation of St. Giles' Cathedral coincided with that of the burgh itself.

The church had a central position as the focus of social, cultural and religious life. In the 1540s new religious ideas took hold, allowing some toleration in the interests of national stability and unity. By 1559, the Protestant Reformation had begun. The most fundamental shifts in Scottish life took place between 1558 and 1560 when a minority of the Scottish nobility, merchants and craftsmen acting from a mixture of religious and political motives, came together in the Reformation Parliament of 1560 to reject the authority of the Pope over the Scottish church (Smith, 1996). But the same coalition of forces was not prepared to deny the role of royal authority in the government of the new Kirk, or to support the radical blueprint for social change.

Improvements in the urban life and on increasing population made it necessary to provide more urban services. Political, legal, religious educational and cultural functions began to broaden the range of activities, particularly in the fields of art, merchandise and crafts. According to Macrae (1947), in the year 1551 great changes took place following the organised destruction of the buildings of the Roman Catholic

Church and the clearing of the sites of monastic foundations, changes which were to lead to important new uses for the land.

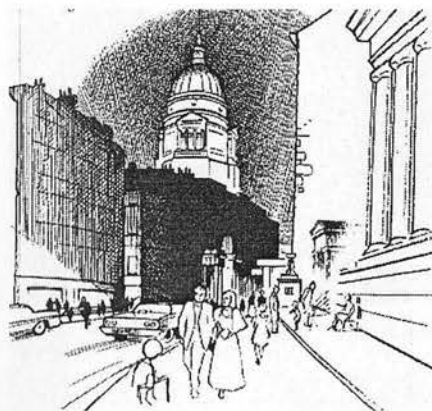
Constructing educational buildings came to have a huge effect in the cultural transformation of the city deep structure, making higher education one of the major land users of Central Edinburgh and an essential component of the city's economy and future economic growth prospects.

Edinburgh University and some more educational and cultural institutions was founded, and extra range of institutions dealing with the social needs and culture of the community were built. The Royal College of Surgeons was founded in Edinburgh in 1506 and the city began its long association with the medical profession. In 1582 the Scottish University began to rise and prospect under the control of the city fathers. Edinburgh University achieved its international reputation from 1760 (Royle 1982).

The University of Edinburgh's expansion had great influence of deep structure of the city and transformed the functional role of the area to be an educational centre of the city. Keeping this land use and enhancing it is a cultural force, which reflected heavily on the surface structure of the city and its essential cultural and business life (figure 6-39).

**Figure 6-39:**  
Old College, University of Edinburgh as seen from  
Surgeon's Hall

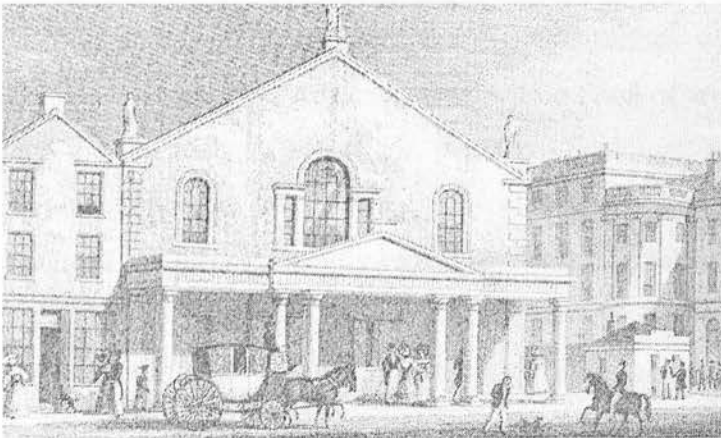
**Source:**  
Edinburgh Alphabet, J. F. Birrel, 1980



According to Geddie (1900), in 1783, it was fashionable to go to church, and people were interested in religion. Sunday was observed by all ranks as a day of devotion and it was disgraceful to be in the streets during the time of public worship. Twenty years later, attendance in church was so neglected that Sunday was made a day of relaxation and in the evenings often became loose and riotous. The streets were often crowded in the time of worship. Revolutionary ideas burst out through the gap offered by the North Bridge. Not with impunity did Edinburgh break from its shell on the hill, and fluttered

out into the open. Clergymen believed that Spirit of Evil was embodied in the theatres that sprang up first regularly one having risen at the north-eastern corner of North Bridge.

More cultural activities like theatre, concert, supper party, ball and club were popular. These cultural activities visualised in the form of theatres and the series of assembly rooms. Theatrical performance in Edinburgh began early in the eighteenth century. Plays continued in a very small theatre in Old Playhouse Close, off Canongate. The new hall was completed in 1762, which was ruined by the building of the South Bridge. But as cultural demands were intrinsic force, a new theatre was opened just north of the North Bridge, in Shakespeare Square, in 1769, known as the Old Theatre Royal (figure 6-40). Taverns were also the meeting place of clubs. The Assembly Room was reconstituted. The Assembly Rooms in the High Street faced increasingly competition, a new Assembly appeared to serve the inhabitants of the new southern area, a sign of balance and equilibrium in functional transformation. Among the places of public amusement in Edinburgh, the Assembly rooms in George Street established in 1710. Kirk's Gateway Theatre in Leith Walk after establishment of the Civic Theatre at the Royal Lyceum had been sold to Scottish television. Royle (1982) says that for entertainment outside the law courts, there were numerous Balls and Assemblies in 18<sup>th</sup> century.

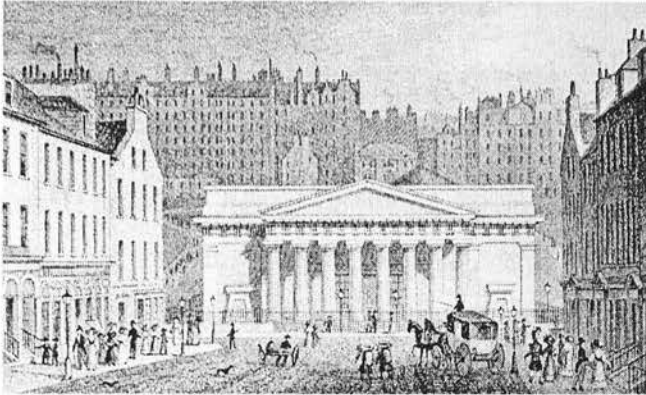


**Figure 6-40:**  
Theatre Royal

**Source:**  
Edinburgh in the 19<sup>th</sup> century,  
T. Shepherd, 1829, from 2<sup>nd</sup>  
edition 1969

The movement and shift of society to the New Town produced the eclipse of these older assemblies. In the 1780's hotelkeepers advised that the new Assembly Rooms should be built in the New Town. The town council donated a site in George Street, where concerts could conveniently be given just as the pre-existing hall off the Cowgate began to be deserted.

According to transformation in the socio-cultural taste of people some public building erected in the third decade of 19<sup>th</sup> century. On the north end of the Mound for the Royal Society of Edinburgh, the Society of Scottish Antiquaries, the Institution for Fine Arts and the Board of the Trustees for Manufactures and Fisheries erected. These land-uses gave special cultural character to that area and made it an inseparable part of the city main structure (figure 6-41).



**Figure 6-41:**

Royal Institute for Fine Arts

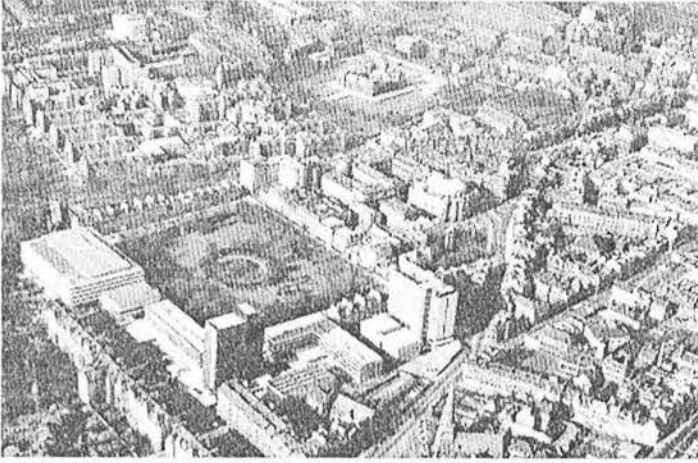
**Source:**

Edinburgh in the 19<sup>th</sup> century,  
Shepherd, 1829, from 2<sup>nd</sup> edition 1969

Shepherd (1969) reveals some aspects of the cultural transformation, which was the root of visible manifestation of the cultural elements. He writes that there three subjects belong to the general history of Edinburgh: printing s and publication, the fine arts and the progress of music. He concludes that printing business and publication were the root of the establishment of the University in the 16th century that later on fostered a new era in the literature of the city. The fine arts of Edinburgh, flourished in the city. Fashion and wealth supported the higher specious of art. The artists of Edinburgh attempted to found an Academy for the promotion of art, producing various associations like the Scottish Academy of Painting, Sculpture and Architecture, and in 1829 Edinburgh had its own College of Art (one outcome of which is this thesis). In the Progress of music Assembly rooms in George Street, held The Gentleness Concerts, in 1812. In the year 1814, a number of respectable gentlemen of the city and country proposed a Musical Festival at Edinburgh.

In the 20th century, art and education have been structuring functions in the transformation of the city. The important changes were in George Square, where major land-use and the much-regretted demolition of one half of the Georgian square changed from residential to university buildings. The South West area of Old Town included the great complex of the Royal Infirmary, as a teaching hospital linked to the University of Edinburgh (figure 6-42).



**Figure 6-42:**

University of Edinburgh in George Square

**Source:**

Edinburgh the story of a city, E. F. Catford, 1975

Intrinsic cultural forces supported by major institutions such as the University of Edinburgh and the Royal Infirmary still contribute to the South-side's vitality. Educational land use within the area is still very important because of Edinburgh University, the Edinburgh College of Art, Moray House and George Heriot's School. The renovation of the Edinburgh Festival Theatre further enhanced the significance of the Southside as a location for cultural and entertainment uses.

As a result of functional transformation in the 20<sup>th</sup> century, Edinburgh was changing in character as well as appearance. Edinburgh no longer is the stage for the conflicts of nobility. The boom of educational facilities such that the number of young persons that crowd the city from different countries is prodigious, and their demands and imputes have done much in fomenting and burgeoning cultural and entertainment sectors. .

The cultural land uses chain contain the main cultural and social function such as the museums, and galleries is a consequence of the cultural force and character in the city. These groups of activities now are also providing appropriate cultural and artistic activities to respond the tourists' expectation and this is a new form of cultural forces on the city main structure. In regards, from 1980's chief rehabilitation efforts followed in the Grassmarket and around Waverley Station area. Erecting the new Scottish Museum in Chamber Street in the last years of the 20<sup>th</sup> century was a great effort toward improving the cultural complexity of the main structure from within.

The latest signs of surface structural transformation are a creeping growth of cultural functions from the central area alongside the major axes. There are two considerable areas that have undergone physical change inspired by cultural forces and demands. The



first is Lothian Road and Morriison Street where a number of convert halls, cinemas and the Edinburgh Conference Centre is stretching the branches of the main structure to the west. The deliberate 'gentrification' of Leith, and the emergence of vibrant 'gay quarter' with cafes, theatres and multiplex cinemas along Leith Walk is evidence of development under powerful cultural forces.

The aim of establishment of Edinburgh theatres was to provide a centre of cross fertilisation between traditional and modern Scottish life, religion and culture. Since the mid-1980s the Netherbow Arts Centre has been closely involved in efforts to renew the community life of the Old Town for the benefits of both residents and visitors.

Museums and other cultural projects have the potential not only to create jobs, but also to enhance the quality of life for the city's residents as well as visitors. New high quality and all year attractions such as the Festival Theatre, the William Younger Centre and the New Museum of Scotland as well as improved promotion and making of new and existing events and attractions will all help to achieve this aim.

It is also need to overstate the massive influence of the Edinburgh International Festival on the cultural life of the city. Started in 1962, taking the opportunity to showcase the 'high arts', it found itself challenged by 'The Edinburgh Fringe Festival'. This was an attempt to democratise the festival by establishing a new populist, less expensive and more 'radical' rival with nearly 700 performance companies, ranging from comedy to music, currently using the three weeks of the fringe to establish or constitute a toe-hold in the lucrative entertainment industry, and attracting people to the city, this cultural monster sees prices for food, drink and accommodation escalate during its residency.

### **6-3-7 Historical- Forces**

The historical forces are particularly important in old cities because of their significance as heritage and conservation areas. The value of such places to a nation is a massive pressure on the developing process of cities and so in Edinburgh people are very concern about their historical heritage. This concern was reinforced in January 1996, when, in recognition of their outstanding architectural, historical and cultural importance, the Old and New Towns of Edinburgh were declared a World Heritage Site. The historical role of the Edinburgh centre supports the long held viewpoint that the Old Town is the appropriate place for the Scottish national institutions.

Historic buildings are a vital part of urban character. The quality and interest of these kinds of buildings in Edinburgh reflect its long history and early development as a royal residence, centre of court and government and its development as a centre of learning, culture and commerce, because these historical buildings cover all aspects of the city transformation.

Historical forces have been a source of grant aids that the council provides towards historic building restoration work within the Old and New Towns Conservation Areas (figure 3-39). Conservation areas define areas of quality, special character and interest. New development and change, to be acceptable, must take proper account of that character and how it may be enhanced. The committee responsible of the conservation has a Maintenance Inspection Service, which identifies eligible repairs. Conservation in Edinburgh is not simply a matter of preserving historic buildings, but also a general rehabilitation of the whole social environment to provide a functional context for any conservation scheme.

The conservation zone was defined in 1965, when the historical Old and New Towns came in conflict with the demand of space for different land uses. The strong desire to make maximum use of spaces in the conservation areas derives directly from the historical force, which is very strong in the Edinburgh main structure.

The Scottish Tourist Board also believes that tourism can potentially provide particularly suitable new uses for old buildings, notably as accommodation of various types, galleries, workshops and shops.

In conclusion the historical forces might limit some aspect of changes within the conservation areas of the city main structure but provides Edinburgh with great economic effects. The consequent developments regarding the tourist needs and the programmes like the Festival and Fringe are important to the Old Town and made the area accommodate a lot of cultural land uses.

## 6-4 People's perception of the underlying forces

Hand in hand with applying a structuralist paradigm to study the city, the author carried out a survey by way of a questionnaire. The intention was to benefit from the shared knowledge of the people of Edinburgh, by inventing them to mention urban elements that they find significant, express aspects of this importance in their own words and also show their location on hand-drawn (cognitive) maps. The results of the questionnaire confirm the research analysis in three aspects: indicating surface structural elements, referring to the underlying forces in the form of reasons of importance mentioned and finally in expressing a cognitive 'image' of the city main structure on the cognitive maps. The author also indicates the location of the buildings, areas, and streets on standard maps of the city. The reason is to indicate to what extent these significant surface components define a specific area.

### 6-4-1 The surface structural elements

The first advantage of the results shows surface structural elements such as buildings, areas, streets and features, either natural or man-made.

In the first four questions people directly pointed out the most important objects (buildings, areas, streets, features) and the reasons of their importance. The location of these structural elements could illustrate the boundaries of the city main structure, which embraces most of these outstanding structural elements. This boundary also embeds most of the important urban land uses and activities according to people of Edinburgh (map no.6-1).

The diagram 6-1 shows the responses to question in terms of frequency of significant buildings within the city. The majority of these prominent buildings have played a great role in the city's long social, cultural and economical transformation.

These buildings are the emergence of the deep structure of the city pushed by the underlying forces in the process of transformation. Their role in urban life keeps them prominent in the shared memory of the society. The Old Town nucleus or the Castle is still, from the historical-monumental point of view, one of the most popular attractions in Edinburgh. The Castle is symbol of the concept of centrality within the whole city structure.

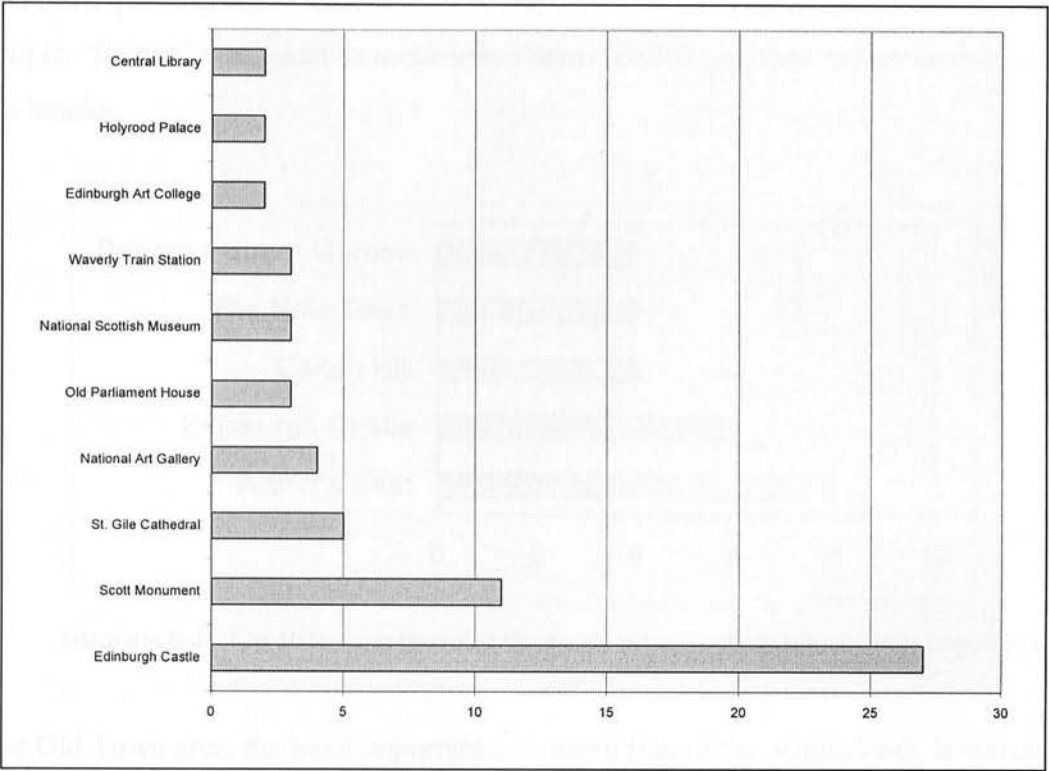


Diagram 6-1: Top 10 buildings (question one) according to the questionnaire’s respondents

The responses to the next question (diagram 6-2) indicate the most important areas to the respondents (map no. 6-2). These elements are highly engaged in daily life of the society.

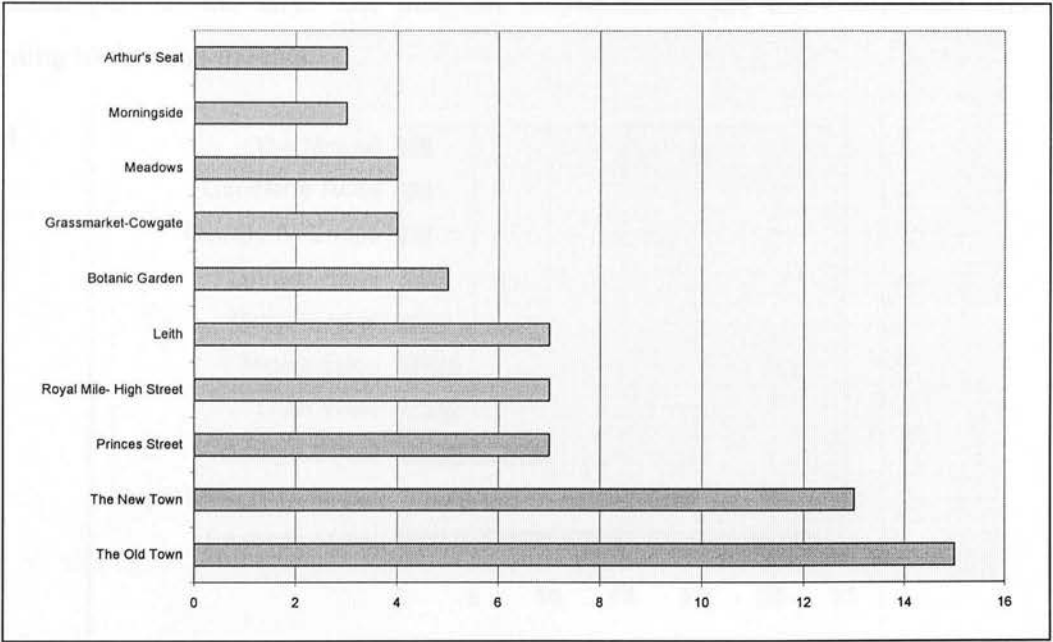


Diagram 6-2: Top 10 areas (question two), according to the questionnaire’s respondents

The third question asked about the most important features in the city. For this group of people, ‘feature’ was taken to mean urban areas, buildings, open spaces or even natural landmarks.

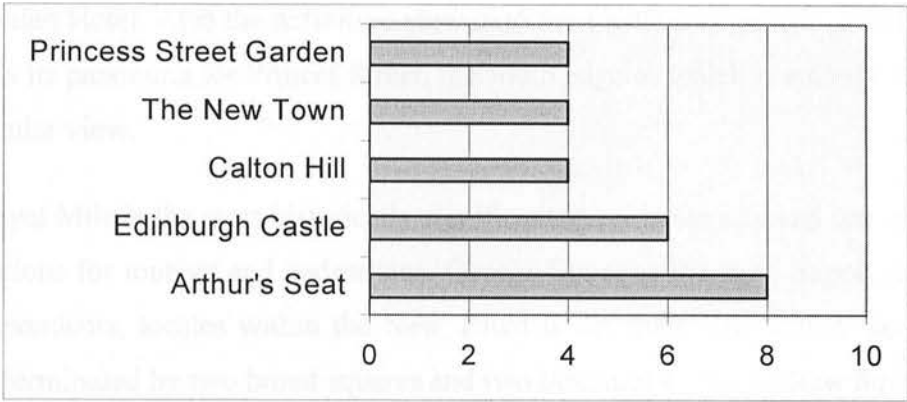


Diagram 6-3: Top 10 features (question three), according to the questionnaire’s respondents

The Old Town area, the most important area according to the respondents, is surrounded by an almost continuous belt of great public open spaces formed and dominated by the Castle Slopes and Princes Street Gardens, the Meadows, Holyrood Park and Arthur’s Seat, and the Calton Hill area. These places are amongst most important features of the city.

Apart from the remarkable buildings, some old streets are prominent physical elements of central part of the city. The diagram below shows the most important streets according to the respondents.

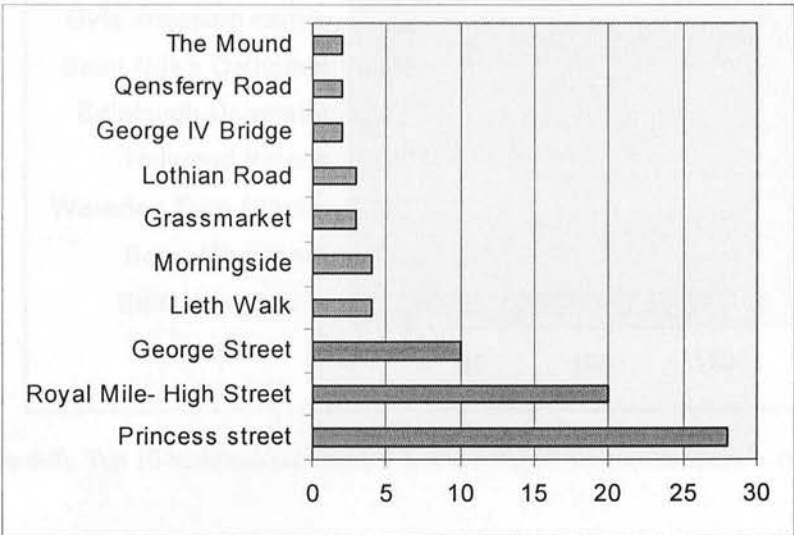


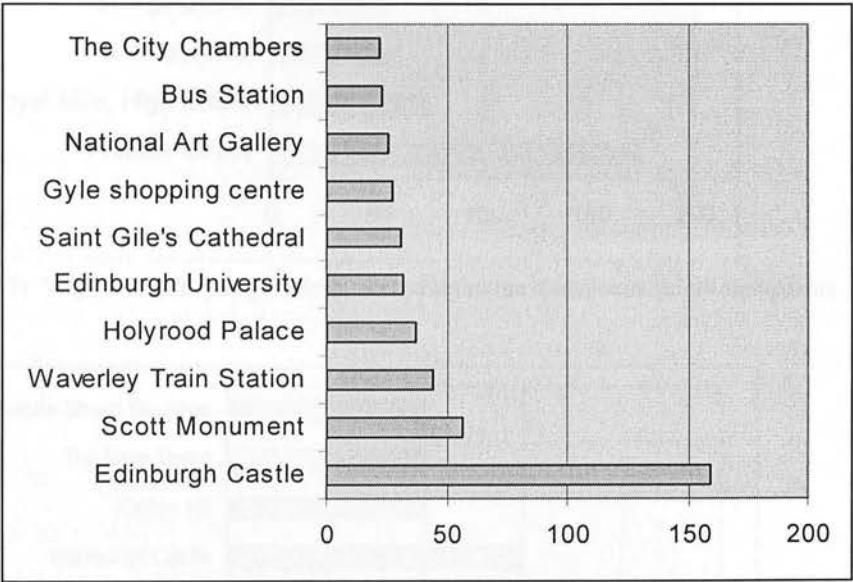
Diagram 6-4: Top 10 streets (question four), according to the questionnaire’s respondents



The New Town and its structural elements are also a part of the city main structure. Princes Street as the most mentioned street, embraces more than a dozen of landmarks and urban remarkable features: Registry House, the Scott Monument, the Royal Scottish Academy, the National Gallery, Waverley Market, Jenner’s, St. John’s Church, and Caledonian Hotel. Also the definitive view onto the Castle and the upper half of the old Town is its panorama for Princes Street, the south edge of which is entirely open to this spectacular view.

The Royal Mile is the most historically significant street in the city and one of the major destinations for tourists and pedestrians. George Street as the third important street for the respondents, locates within the New Town is the main axis within the First New Town, terminated by two broad squares and two landmarks - St. Andrew Square eastern end with the St. Andrew monument as its landmark, balancing Charlotte Square with St. George Church landmark to the west.

To determine the continued frequency of the objects, the number of times they were mentioning in response to all the questions is counted. The top ten of each case are shown below and in maps no. 6-3 and 6- 4. Some of these places were mentioned under different categories of objects, land-use or activities.



**Diagram 6-5:** Top 10 buildings (all question), according to the questionnaire’s respondents

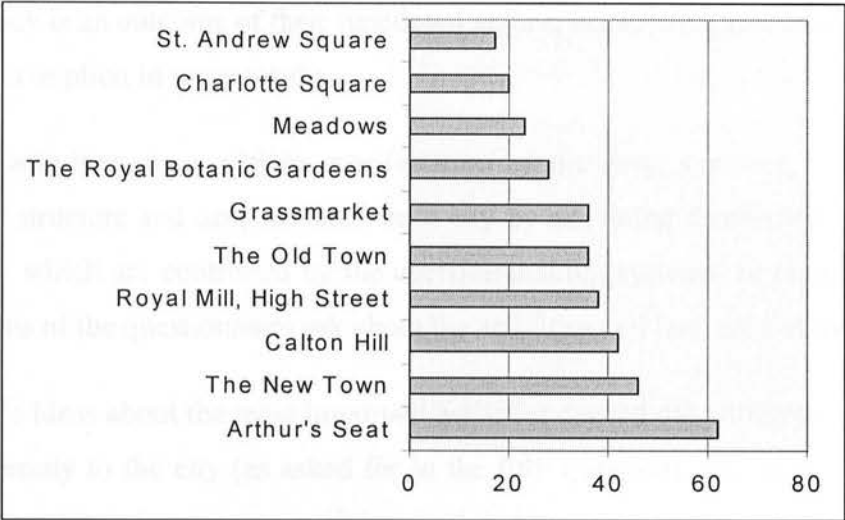


Diagram 6-6: Top 10 Areas (all question), according to the questionnaire’s respondents

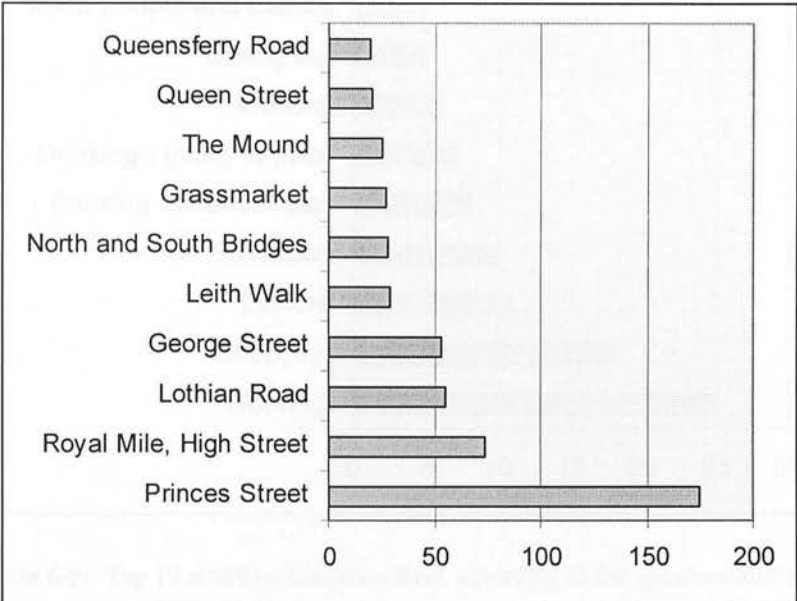


Diagram 6-7: Top 10 Streets (all question), according to the questionnaire’s Respondents

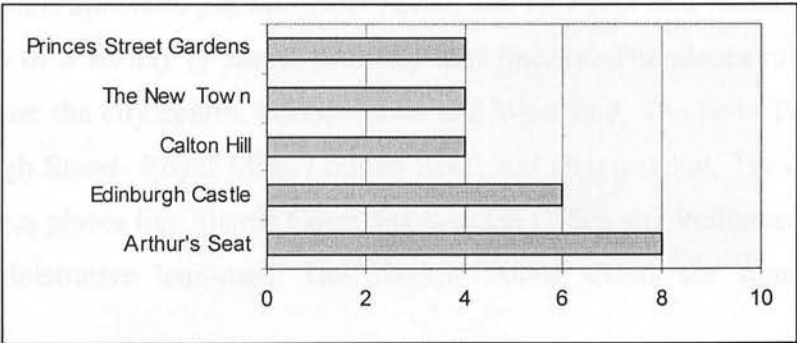
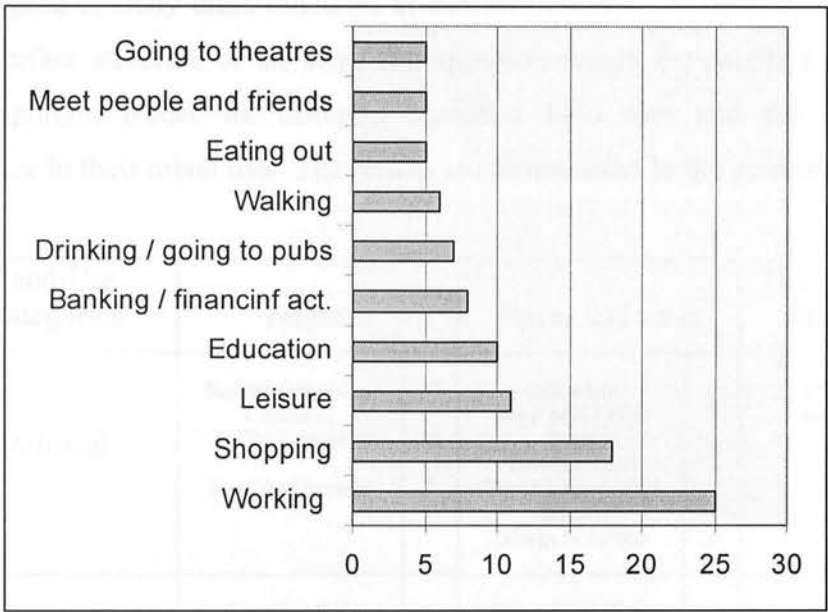


Diagram 6-8: Top 5 features (all question), according to the questionnaire’s respondents

The difference in arrangement between the first group of responses and the total frequency is an outcome of their functional values, because the role of activities in these places is implicit in these results.

Urban activities are a visible manifestation of the deep structure, bridging between surface structure and deep structure in a city by activating demands and desires of the society, which are controlled by the decision-making systems. In regards, some of the questions of the questionnaire ask about the activities and land uses of the city.

People’s ideas about the most important activities carried out within the city, and which give identity to the city (as asked for in the fifth question), are shown on the diagram below.



**Diagram 6-9:** Top 10 activities (question five), according to the questionnaire’s respondents

The most reasons given for the importance of these activities were: *employment, social contacts, entertainment, physiological needs, kill boredom and relaxation, the wish to buy goods in a variety of shops, economy and finance*. The places mentioned for this question are: the city centre, Princes street and West End, The New Town and George Street, High Street- Royal Mile, Lothian Road and Grassmarket. They also referred to some unique places like Sheriff Court, the Scottish Office and Parliament Square, which have administrative land-uses. The diagram below shows the summary of all the questions.

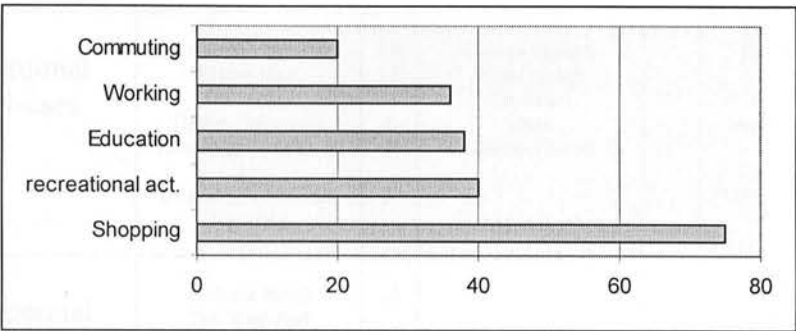


Diagram 6-10: Top 5 activities ( all question), according to the questionnaire’s respondents

Comparison between these two diagrams shows that, except in one case (commuting), the activities are the same and stimulate various administrative, commercial, social, cultural, educational, religious, entertainment and political functions. A further question was designed to study these functions as demonstration of the deep structural attributes on the surface structure of the city. This question sought the people’s ideas about the most important places for different classified land uses and the reasons of the importance in their urban life. The results are summarised in the next table 6-1 and map no. 6- 5.

Land-Use Categories	Features		Places and areas		The reasons of importance	
Political	Scottish Office City Chambers, City Council	13	Calton Hill	6	Centre of local government	10
		10	Royal Mile / High Street	5		
			Trafalgar Place	5		
	Scottish Parliament	7	The Old Royal High School			
Administrative Land-Uses			George IV Bridge	2	Mostly offices Centre of local government Legal centre History and Current monarchy	5 4 3 2
	Court buildings	9	Royal Mile/ High Street	7		
	Sheriff Court					
	City Chambers	8	George IV Bridge	6		
Cultural	Register House	3	St. Andrew Square	5	Music, entertainment and art Theatres and cinemas Libraries	7 3 2
	Holyrood House	3				
	The Museum	9	Chamber Street	7		
	Art Galleries	7	High Street/ Royal Mile	4		
Religious Land-uses	Usher Hall	6	Lothian Road	3	Various main churches Royal Abbey	6 1
	The Castle	3	The Old Town	2		
	Saint Giles Cathedral	22	High Street, Parliament Place	3		
	St. Mary’s Cathedral	10	The West End	2		
	Holy corner, Church hill	4	Morningside	1		

Educational Land-uses	Edinburgh University	19	George Square,	3	Education for all people	2
	Heriot-Watt University	11	Bristo Square	1	Ancient University	1
	Napier University	4	Lauriston Place	1	Concentration of University Buildings	1
	Edinburgh College of Art	3	Chamber Street			
	Central and National Libraries	3				
Commercial Land-uses	Princess Street	14			Shopping	6
	The West End				Finance and Insurance	5
	George Street	8			Banking	
	Gyle Centre	5			Most large offices	5
	St. Andrews Square	4			Concentration of shops	3
	Lothian Road	3				
Entertainment	Festival Theatre	8	Grassmarket, Cowgate	5	Theatres, cinemas, concert halls	10
	Playhouse	9	Lothian Road	3	Places to eat and drink, pubs and restaurants	2
	Usher Hall	9	Princes Street, West End	2	Many places, providing entertainment for large number of people	2
	King's Theatre	5	Nicolson Street	2		
	Film house	4				
Monumental	Scott Monument	24			Historical significance	3
	Edinburgh Castle	13			Tourism	2
	Calton Hill	7			Dominating city skyline	1
	High Street	2			Having several monuments	1
	Princes Street and Gardens	3				
Terminal	Waverely Train Station	29			City centre location	3
	Bus Station	18			Link to the rest of the country	2

Table 6-1: Important places for different land-uses

The mixed-land use pattern is a result of the mechanism of interpretation of the underlying forces to provide dynamism and equilibrium within the city main structure. Intensive use of the centre in various activities such as work, shopping, business and leisure, has led to a *live centrality* in Edinburgh which satisfies all dimensions of citizens' needs whilst providing them with national and historical pride and identity.

## 6-4-2 Deep Structure and underlying forces

The most considerable points in the analysis of the mentioned surface structural elements (areas, buildings, streets and features) are hidden in their relative importance to the underlying forces or their value in the city's life. The structural properties of laws of composition and wholeness that integrate these elements in a visible network are also significant. For instance the Scott Monument's location at one side of the most important street (Princes Street) and on the border of two important areas of the New



Town and the Old Town, adjacent to the Castle and Princes Street Gardens has made it outstanding, although its functional value is only as a monument and tourist attraction.

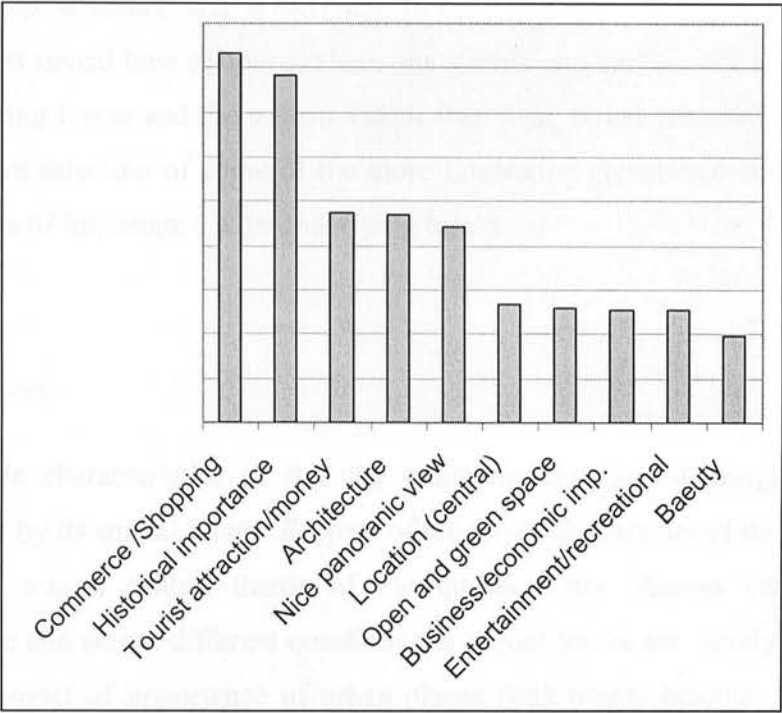
A way to achieve the role of underlying forces in the city structure is managed by asking about the functional character of the whole city and also asking about different urban activities. The underlying forces effect on the fundamental functions of city main structure. The hierarchy as a structural law of composition manifests in the specific and sometimes unique or city wide land-uses within the area, and also is a consequence of the most congested activities within the whole area. High concentration and dynamism of activities have brought the area into a focus of attention and attraction. The fundamental role of the area is not only a result of daily life but also because of the occasional ceremonial gatherings with profound socio-cultural and economic value. Asked about functional characteristics of the city between the five indicated functions in the questionnaire, 28 out of 30 of the respondents put historical and tourism equally at the top of the global function of the city. Cultural functionality (23), political (16) and industrial (6) functions followed.

Although the wholeness of the city structure is based on the way the structural elements work together in a holistic way, each of them achieves its importance because of particular aspects of the invisible deep structure of the city. Table 6-2 shows the frequencies of reasons of importance for some of the most mentioned buildings, streets, areas, and features.

<div>Aspects</div> <div>Urban objects</div>		Tourist attraction	Commercial, shopping	Historical, symbolic values	Nice, Panoramic view	Central location
Princes Street	175	7	97		9	16
Edinburgh Castle	159	17		57	13	7
Royal Mile, High Street	74	19	9	22		5
Arthur’s Seat	62			2	15	4
Scott Monument	57	4		6	2	

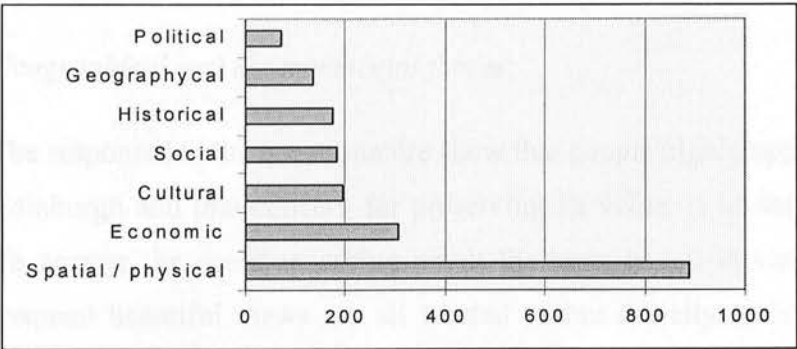
Table 6-2 : Aspects of importance for top 5 objects according to the respondents

A wide range of more than 200 reasons of importance for different objects and activities, were mentioned by people. The most frequent reasons were:



**Diagram 6-11:** Top 10 aspects of importance ( all question), according to the questionnaire’s

Seeking correlation between aspects, objects and activities, these huge variety of reasons are categorised and interpreted under a number of dimensions, which offer a clearer picture of underlying forces. Regarding the variety of answers, the predominant dimensions are: social, which covers recreational aspects; economic, which covers functional aspects; cultural; political; historical; natural-environmental; spatial, which covers, architecture, aesthetic, different physical aspects and infrastructure; and finally quality of life. For example location and visual values are considered as part of the spatial dimension, while meeting friends or nightlife were considered under the social dimension.



**Diagram 6-11:**  
The most important Underlying forces elicited from the responses to the questionnaire

### 6-4-3 Reading underlying forces through the responses

Part of the qualitative analysis of the questionnaires is based on the research hypothesis on the deep structure and underlying forces. The core concepts expressed by the respondents reveal how people evaluate the visible and surface elements in accordance to underlying forces and the system values that those forces provide. These sub-section looks at are selection of some of the more interesting correlation between the reasons and aspects of importance with underlying forces.

#### *Spatial forces:*

The visible characteristics of the city main structure in Edinburgh are profoundly influenced by its spatial forces. Respect of the physical character of its public places and buildings, was a central theme of the questionnaire. Across various reasons of importance and across different questions the spatial forces are clearly traced. The most frequent aspect of importance of urban places (888 times) belongs to the underlying spatial forces. It is not necessary to refer to all these reasons but the most common of this group were: architecture (94), location (54), beauty (39), antiquity (23), material of buildings (21), landmark (15), and focal point (10). Even when physical aspects were spoken of in a negative way, underlying spatial forces were represented: ugliness and boring (29), poor design in historical area (29).

A profound desire to preserve the panoramic view, and vistas within the city, taking advantage of its unique geographical position, is another aspect of spatial underlying forces achieved by the structural properties of laws of composition, and spatial order. Visual quality was pointed out 114 times, including *overview* (89), as a reason of the importance of urban objects and *skyline* (14) which crystallises the visible result of laws of composition into a comprehensive and unified city image.

#### *Geographical and Environmental forces:*

The responses to the questionnaire show that people highly appreciate the topography of Edinburgh and that concern for preserving its value, is an important underlying force. To answer the question asking about the most beautiful views in the city, the most frequent beautiful views are all located within the city main structure: Arthur's Seat

(33), Calton Hill (24), Edinburgh Castle (11), Scott Monument (8). For the nicest view within the city, 28 respondents referred to the Castle and 13 mentioned Princes Street at night with its monuments and view to the Castle. The Old Town was attractive from this point of view only for 4 persons. This indicates that the advantage of the unique geography of the city, much more than its architecture can be considered as the appropriate motivation behind this group of responses.

Today's visible structure of Edinburgh also is an elaborately respectful outcome of geographical and natural underlying forces, as supported by people in Edinburgh. The geographical and environmental aspects of importance were pointed out 133 times in different questions. *Unique geography* (23), *natural beauty* (18) and *environmental value* (22) are the highest mentioned aspects amongst all in this category.

#### *Social forces:*

The respondents referred 24 times to the socialising aspect of activities. The reasons given, in their words were: *feeling of not being alone, meeting friends, spending time, mixture of people, being a busy and congested area, variety of activities and hosting events*. The most interesting social activities in Edinburgh were *eating out, going to pubs and drinking. Having fun and leisure times, and entertainment* were given 51 times in different questions as important reasons behind mentioning various places within the city. The setting of historic buildings is an incentive to the outdoor activities.

In Central Edinburgh the social importance derives not only from its daytime activities but also from its nightlife and leisure. *Nightlife* as a reason of importance of places has mentioned 4 times by people and places are defined nightlife centres are: Lothian Road, Grassmarket, Cowgate, Leith Walk and Princes Street/ Rose Street.

Public open spaces in Central Edinburgh are loaded with interest and recreational value, for active recreation and passive enjoyment, and are readily accessible from where people live. *Recreational activities and walking* as interesting activities within the city centre were recognised important 44 times by people. *Green and open spaces or gardens* are the reason of importance of some city centre areas referred to 52 times. Of those the meadows is one of the most popular, chosen 23 times because people use this place for a range of sports, socialising with friends and picnicking or just simply walking and jogging.

*Economic forces:*

A part of economic forces and economic importance in Edinburgh is the result of the city-wide scale of its functions, which grants a global role to the area and crucial importance in urban life. *Global scale* was noticed by five people as the reason of importance of places and also being an *urban* and *national feature* is a reason of significance for the urban objects (8 times mentioned). *National* and *extra-city importance* was also stated by 7 people. The urban places are valuable because they are *recognised internationally*. *Economic importance*, *business* and *financial importance* were referred to directly by people 51 times.

People were aware of the benefit of the Edinburgh International Festival to their economy and in different questions they referred 95 times directly to tourist money. For respondents to the questionnaire *tourist attraction* is equated to *tourist money*, as a conclusion it has retained a significant place in the mind of people with perceivable reflection on their daily life. The Old Town forms the cornerstone of the city's tourism and is a priority for investment focus of tourist and festival activities. The Old Town and High Street were mentioned 25 times for its tourist attraction, which present a contemporary picture of the anatomy of the ancient capital

This area is also considered important as a living and working organism within the city as a whole, having been cited 36 times in various questions as the centre of different activities, particularly governmental, legal and official land uses. Its spine or High Street and Royal Mile and Parliament Square have also been pointed out 38 times because of different activities.

*Employment* is the reason why 57% of the responders go to the centre. More than 40% of people referred to different parts of the New Town (St. Andrew Square, Charlotte Square, George Street and Princes Street) as the most important official areas within the city centre and more than 50% for commercial reasons.

Shopping was mentioned 75 times as an important activity in the city. The responders talked about shopping 167 times in different questions as an aspect of importance of different places. In this case Princes Street is of prime importance to Edinburgh. It is a major shopping street and the main access and commercial centre of the city. *Location in city centre*, *accessibility*, *lots of high quality shops* with *variety of choice*, *good*



*atmosphere* and *restaurants* covered 93% of the most important reasons why people go shopping in the centre, particularly Princes Street

The *evening economy* of the Old Town was recognised by responders as an important contribution to the economy of the city and is important in the continuity of its dynamic life.

#### *Political forces:*

Political underlying forces have been engaged with Edinburgh history from its beginning. *Political importance* was mentioned 32 times to different questions. It was significant that Edinburgh is a *capital city* (14 times), which *should have parliament* (8 times), as a *symbol of democracy*, and *is a centre for the nation's* and its *legal system* (1 time). For another group of responders, political aspect helps their city be *recognised nationally* and *internationally* (7 times). Other aspects of political importance of the places for them are *royalty* (4 times), and *defence* (2 times), which are manifested in the Castle and Holyrood Palace. Holyrood Palace was mentioned 37 times in different questions and old Parliament House as a symbol of political importance 14 times.

#### *Cultural forces:*

Cultural characteristics of city is the most important functional characteristic for 77% of the citizens, which is derived from cultural facilities like universities, museums, libraries, theatres and galleries (more than 25% of the reasons mentioned), and also is a result of cultural events like the festival (25%).

The Old Town is important for some citizens because *it is centre of the Edinburgh Festival*, a vast cultural event. For 37% of responders to the questionnaire in different questions, the festival is an important event and activity in the city.

Cultural importance of some places is contributed to its entertainment activities. For 53% of people, Lothian Road and its urban elements like the Usher Hall, the Filmhouse and its restaurants is the centre of entertainment and 30% recognise this area for its cultural value.

The National Gallery of Art was referred to by people 26 times because of its *cultural value* (6 times) as an *international art collection* (6 times), and for its *spiritual*

*importance* (2 times). Other places with cultural values are the different universities, four of them (Edinburgh University, College of Art, Napier University and Heriot-Watt) were altogether mentioned 68 times. The National Scottish Museum was also cited 14 times because of its cultural importance.

#### *Historical forces:*

The respondents referred to the *historical importance* of Edinburgh 157 times, showing awareness of the *national and heritage value* of the urban places. This reason was mentioned 26 times in different questions. The point that the *city should have a parliament* has indicated by eight persons.

In the 1930s, Frank Mears argued strongly that in planning the future development of the Old Town, it should be considered that it is the ancient capital of Scotland and therefore, by its nature, recognised as housing the Scottish past emotionally and also physically, through the legal, administrative, ecclesiastical and educational institutions remaining. For ten people urban elements were indicated as the *symbol of the city*, that *give identity and meaning to people*. In this regard they talk about *character* 15 times that of the urban objects was taken their attention. People say (7 times) that the old places *protect the past and link them to their past times*.

The Old Town's present day roles are therefore inherited from its historical transformation as the heart of Scotland's capital city. People noticed *new use for old building* as something positive because it *brings new life to a dying area* and also *it is great development potential*.

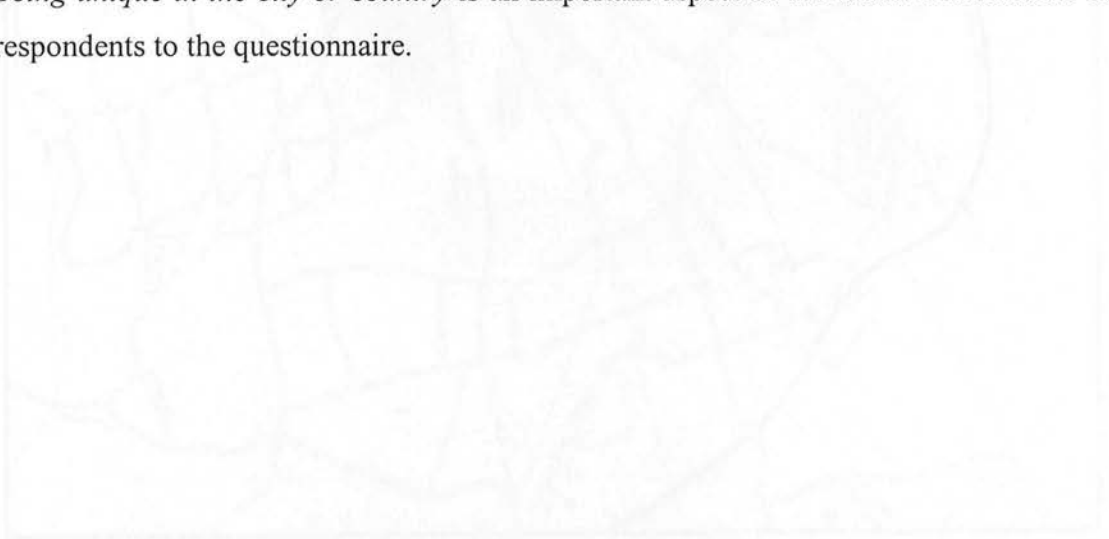
Edinburgh's historical identity is self-maintained by its deep structure in transformation process. Edinburgh's citizens still like very much the old parts of their city. For 70% of them the Old Town and its closes are the most appreciated places in the historical part of their city. People like the Old Town because of its *beauty and attractiveness*, *impressive and pleasurable atmosphere*, *giving character to city*, *cultural values*, *social values*, *variety of activities*, *interesting shops and pubs*, *friendly scale*, *architecture* and *influence on tourism*. For the majority, historical importance was expressed as a reason of their identity, which is also valuable because of attracting tourists. The Castle was pointed out as the first place in this regard, confirmed in the way that, for more than

93% of people, history and tourism are considered as the most important functional characteristics of their city (see map no. 6-6).

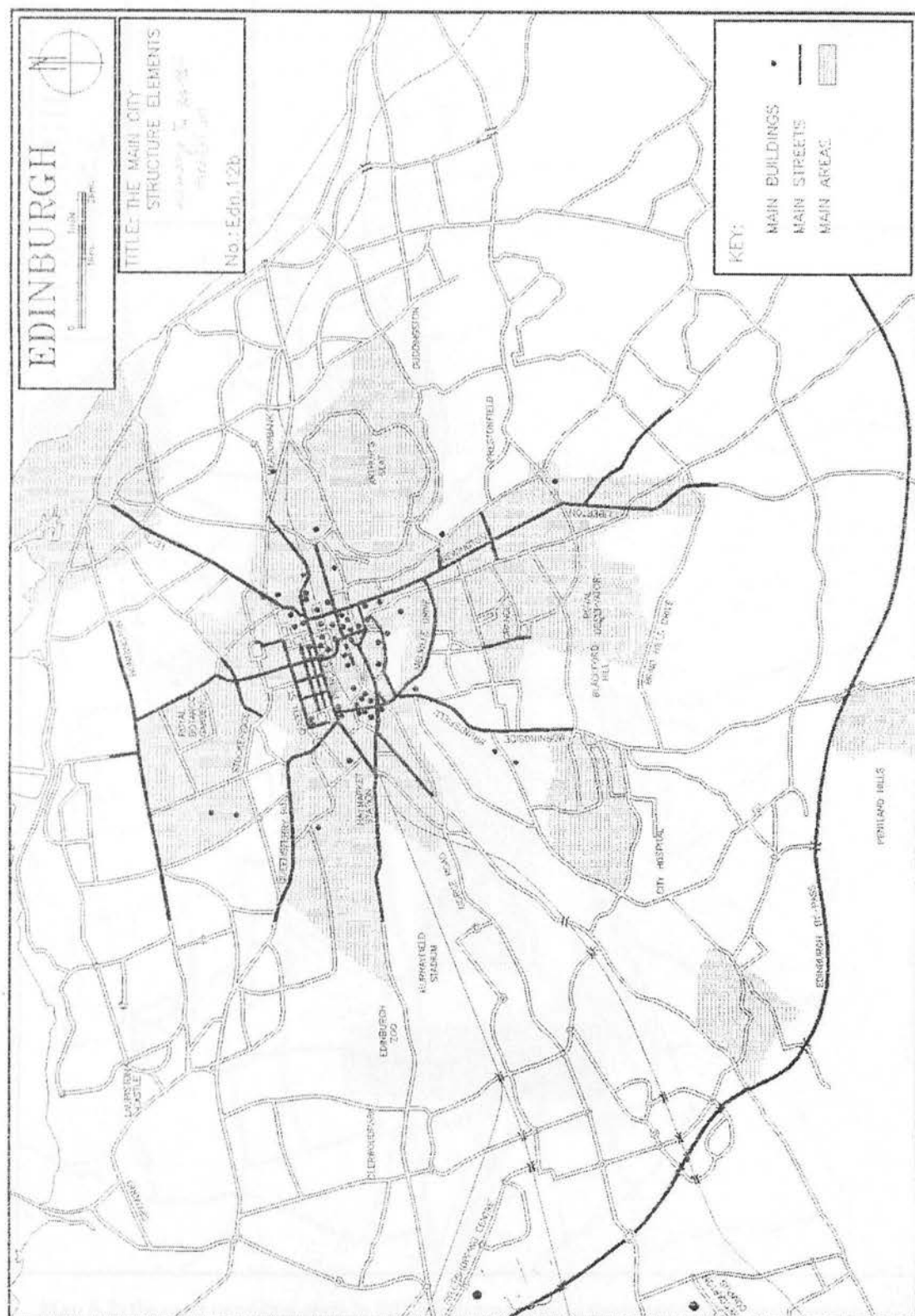
Regarding the frequency of aspects or reasons of importance, tourism is a source of the city's attraction and money for people. People recommend most historical sites and features within the city main structure (Castle, Holyrood Palace, The Old Town, and The New Town) as places tourists should visit. This degree of importance should be observed as the intrinsic forces behind efforts of preserving and rehabilitation of the historical heritage of the city and strengthening the wholeness of its main structure. In this regard the respondents suggest that all historical places, particularly the Old and New Towns, green open spaces like Meadows, Arthur's Seat, Holyrood Park, some fundamental functions like universities and any monuments that reinforce historical values of the city like the Scott Monument, should be protected.

The structural performance of the city main structure is not restricted by its historical values but on the contrary, the Old Town historical importance to the city of Edinburgh plays a crucial role in the economy of the city. Edinburgh got advantage of this specification and so the city main structure is now at the heart of Scotland's tourism economy, based on its historical heritage and historical buildings.

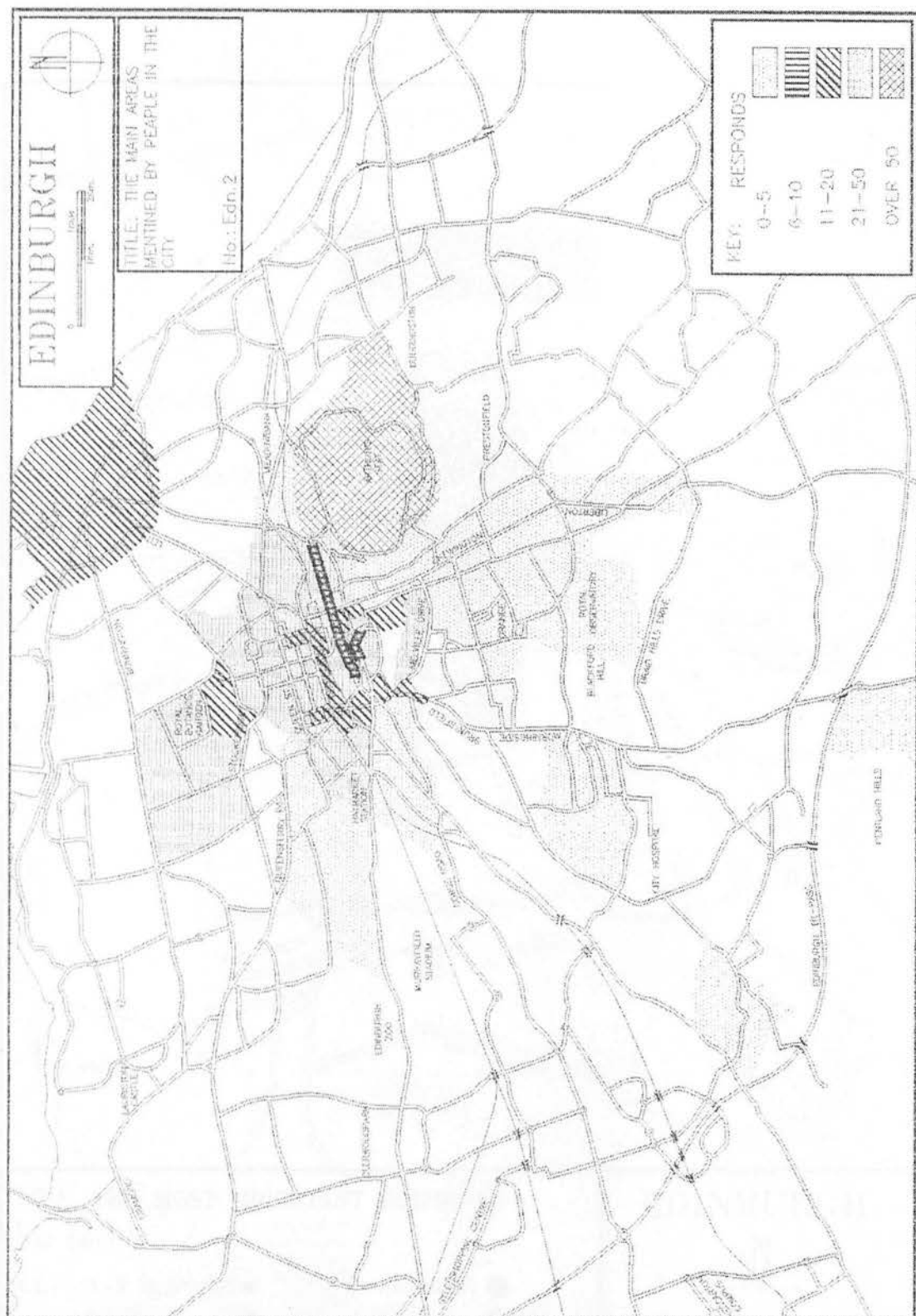
The national and regional importance of Edinburgh main structure is an historical issue. *Being unique in the city or country* is an important aspect of the urban elements for 15 respondents to the questionnaire.



Map 6-6: The most important sustainable Edinburgh according to the questionnaire's results

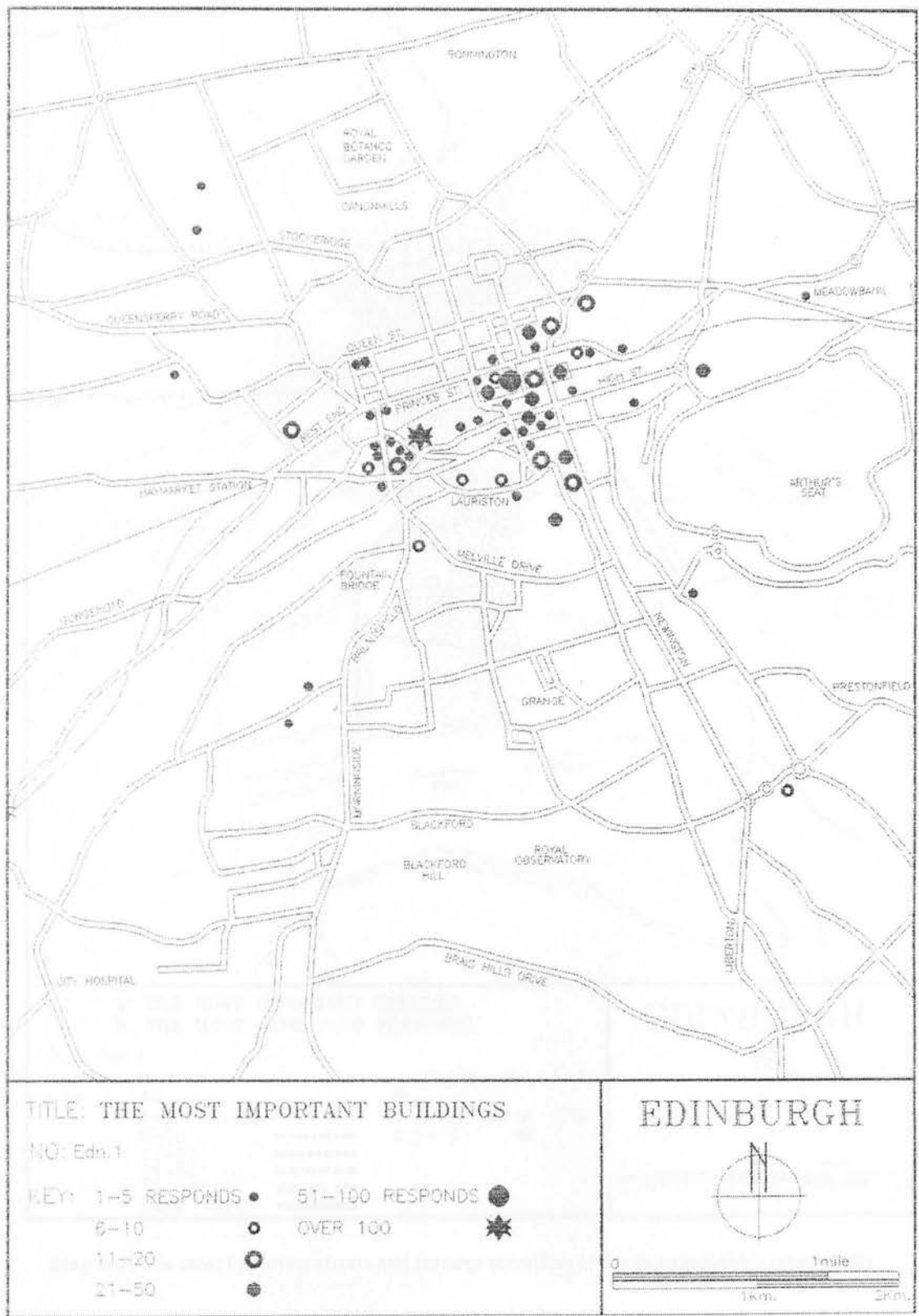


**Map 6-1:** The most important elements in Edinburgh according to the questionnaire's respondents

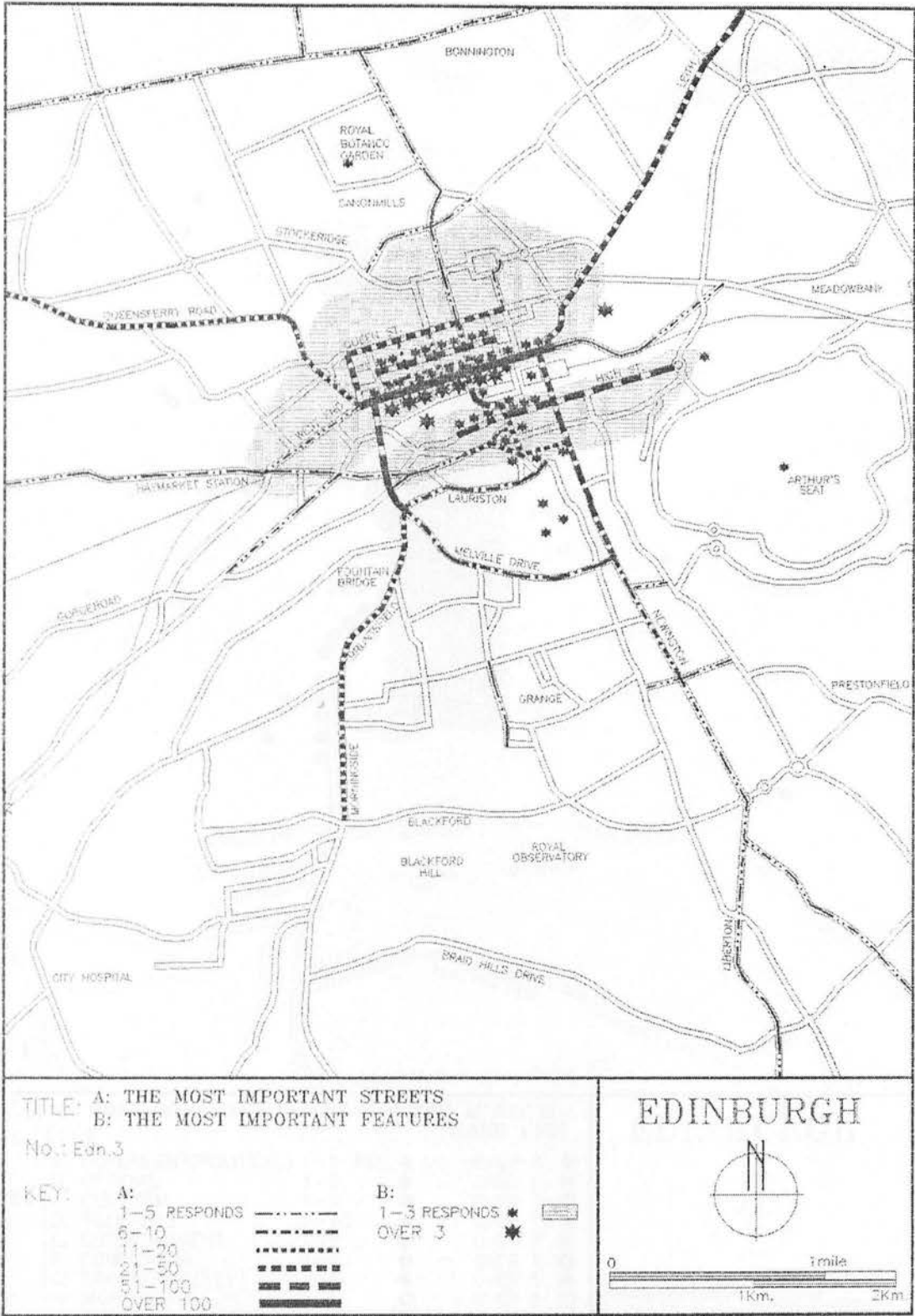


**Map 6-2:** the most important areas in Edinburgh according to the questionnaire's respondents

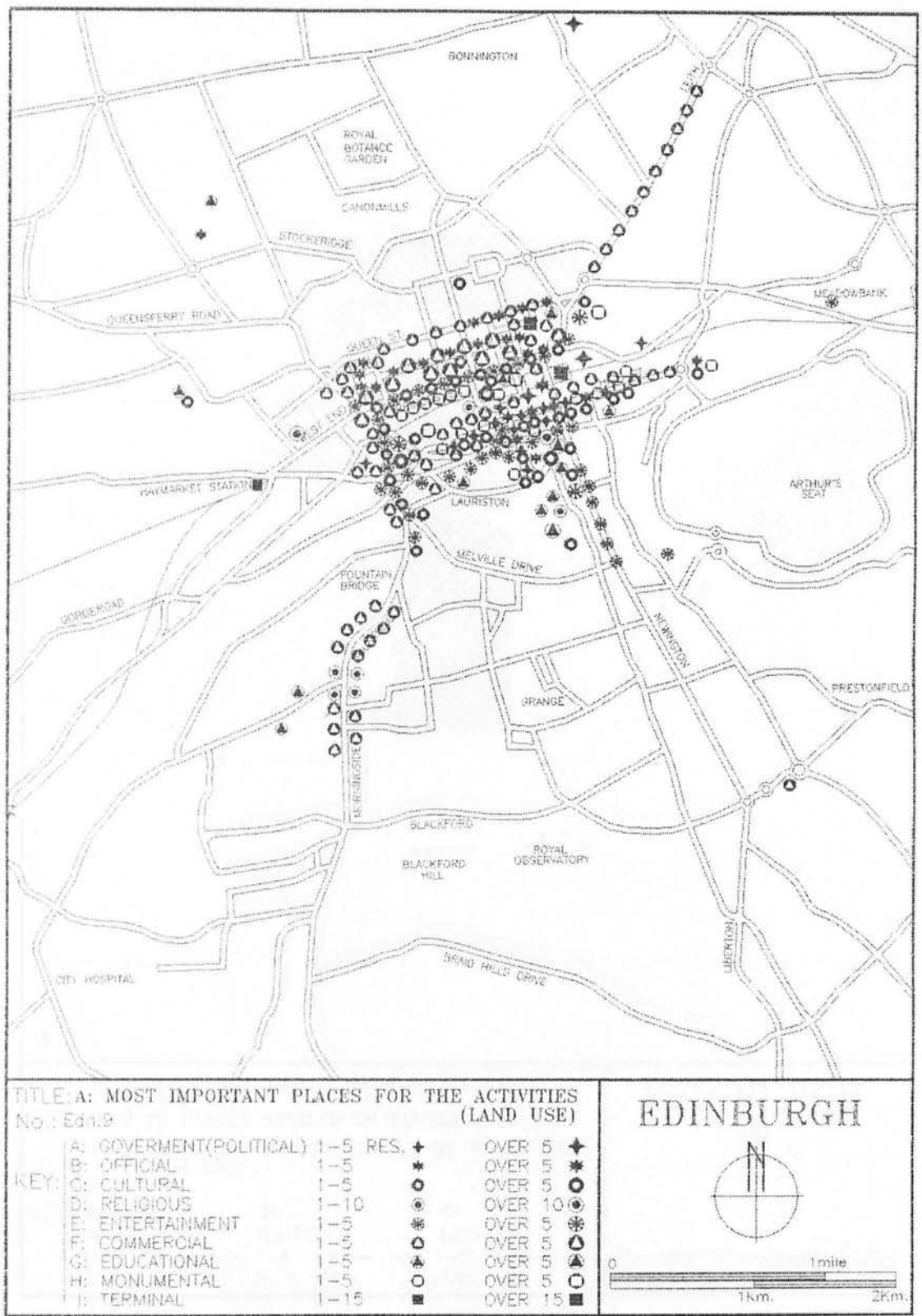




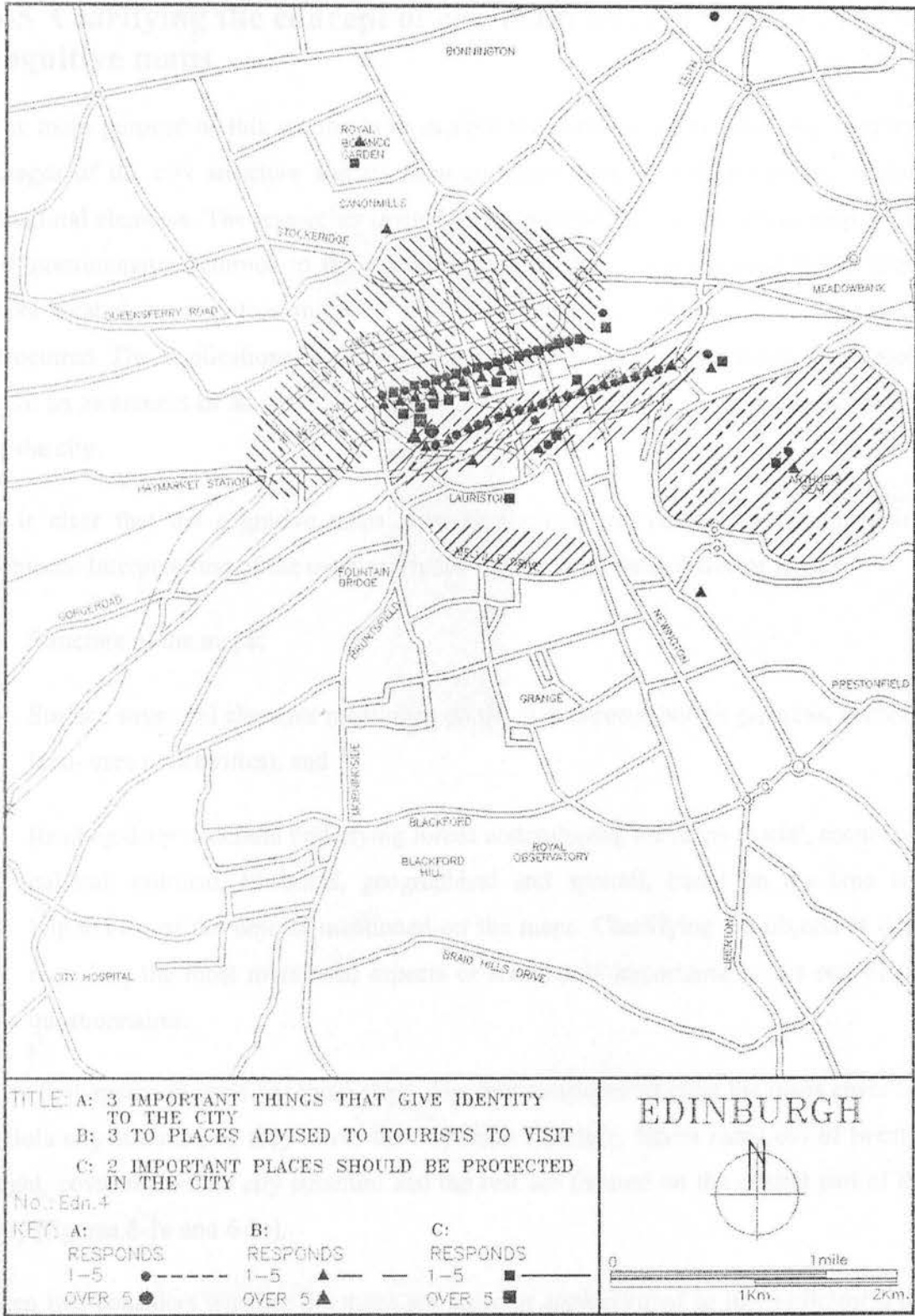
Map 6-3: The most important buildings in Edinburgh according to the questionnaire's respondents



Map 6-4: The most important streets and features according to the questionnaire's respondents



Map 6-5: The most important places for various land-uses, according to the questionnaire's respondents



Map 6-6: The most important identical, tourist attraction urban elements and places suggested to be preserved in Edinburgh, according to the questionnaire's respondents

## 6-5 Clarifying the concept of city main structure from the cognitive maps

The main purpose of this section is to explore the connections between the cognitive images of the city structure and its deep structure through studying surface visible structural elements. The researcher invited the respondents to draw a sketch map. From 30 questionnaires returned to the researcher, 28 of them included such maps. These were treated as cognitive maps of how they understood their city to have been structured. The implications of this discussion are profound. They indicate that people have an awareness of an invisible structure, which strongly shapes their mental images of the city.

It is clear that the cognitive maps have similarities and collections of contrasting subjects. Interpretation of the cognitive maps is done from three different angles:

- Structure of the maps;
- Surface structural elements mentioned on the map (streets, buildings, areas, features, land- uses or activities); and
- Reading deep structural underlying forces underpinning the maps (social, economic, cultural, political, historical, geographical and spatial), based on the type and importance of the objects mentioned on the maps. Classifying the objects is done regarding the most mentioned aspects or reasons of importance in the rest of the questionnaires.

The first approach itself has three steps. The first considers whether the maps cover the whole city structure or they cover the city main structure. Seven maps out of twenty-eight, cover the whole city structure and the rest are focused on the central part of the city (figures 6-1c and 6-2c).

Step two considers whether the maps are *basic* or *sophisticated* or just *sufficient*. Five maps are basic maps, three complete and sophisticated and the rest are sufficient map (figures 6-3c to 6-5c).

Step three focuses on the type of structure of the maps. To read the clarity of the city main structure in people's cognition, Appleyard (1970) suggests cognitive maps could



be categorised into two major groups: those organised around *sequential* elements (paths); those that show spatial *elements* (individual buildings, landmarks or districts). From the most basic maps to the most sophisticated one, four grades could be recognised: *fragmented*, in which dots and names are scattered on the sheet; the *mosaic* of various districts or landmarks and streets which are not well connected; *linked* maps of sequential and spatial elements; and finally the *patterned* or cartographically accurate maps.

Five different types of maps are recognisable amongst these four grades cognitive maps: Two maps belong to the fragmented type (figure 6-6c). Type two is a combination of sequential and spatial elements. Within this type, four cognitive maps are of spatial and sequential elements (figure 6-7c) and three are linked sequential and spatial elements (figure 6-8c). Type three is a *network* map, which is formed of a street network rather than one of spatial elements and the network attracts attention at the first look of this type, eight cognitive maps are linked network maps and five more are primitive network maps (figures 6-9c & 6-10c). The next type recognised is the schematic map showing an abstract cognition of the city structure, which are simply but partly representative of roads, areas, and landmarks in a linked clear patterned way. Four cognitive maps belong to this group (figure 6-11c). The last type is patterned, complicated and at the same time accurate. One out of the three maps of this group is three-dimensional and another one is schematic (figures 6-12c to 6-13c). This group of maps, which are presented in great detail, reflects a clear image of the city in the respondent's mind.

Categorising and defining the structure of the cognitive maps demonstrate a profound perception and cognition of the city main structure in peoples' minds. Structural classification of the cognitive maps also specifies how structuralists properties of structure play a role in formation of cognitive image of the structure of the city in people's mind.

Although the questionnaire did not ask for a sketch of the city centre, a majority of people selected this area to represent their city, even for those who presented the whole structure of the city, the city main structure and its major elements were emphasised either by pointing to the places or drawing more details of that area. This shows how the properties of centrality and hierarchy within a structure (which result from its laws of composition) reflect on perceptions of the whole city. The wholeness of the city

structure also could be traced on the maps, which present the whole city structure in a simple but very clear way (figure 6-14c).

A comparison between various structural classifications of the cognitive maps discloses a very important point. Out of 28 cognitive maps, only two are fragmented, four belong to the mosaic type and the remaining 22 are linked maps. This concrete spatial relationship is a reflection of structural quality of the cognitive maps and is a result of the property of wholeness that has been preserved and sustained through long process of the structural transformation.

Not only is the network maps frequency higher (45%) than other types of the maps, but also the frequency of streets mentioned on the maps is higher (52%) than the number of the objects (32%) or areas (16%). This is evidence of how people structure their image of the city. One might consider this as a result of structural performance of the streets within the city structure rather than the buildings, because by this it has become more perceivable by people and they can orientate themselves within the city structure and organise urban features and land uses based on these structural elements. Some of the most dominant features within the city structure, like Edinburgh Castle and Arthur's Seat, are also focal points in the visible structure of the city, even for those who were not able to link these spatial elements with the rest of their map.

The second approach for interpreting of the cognitive maps is based on the variety of the surface structural elements on the map. This approach is an effort to see which of the structural elements of the city structure have more structural performance in people's mind. More than 80 different places were included on the maps (map no. 6-7). The highest frequency of the buildings and landmarks belong to Edinburgh Castle (27), Holyrood Palace (14), Waverley Train Station (11), Scott Monument (9) National Art Gallery (9). The most frequent street are Princes Street (27), High Street, Royal Mile (22), George Street (19), Lothian Road (17) and The Bridges (15). The most mentioned natural features are Arthur's Seat (13) and Calton Hill (10) and the most repeated area are the New Town (13), Grassmarket (12) the Meadows (8) and the Old Town (5). Pointing out these elements on the maps is a manifestation of emergence of deep structural importance on the visible surface structure of the city. Almost all of the 80 urban elements which are mentioned play considerable role in the structural performance and structural transformation of the city, even the elements which are

mentioned only a few times like the City Chambers, High Courts and National Library, or Morningside and Nicolson street.

Reading the deep structural underlying forces is the output of correlating the objects mentioned on the maps and the importance of these elements in people's mind. These objects are then classified regarding the most mentioned aspects or reasons of importance in the rest of the questionnaires for those objects.

The streets that dominate on the maps, are the most significant commuting roads within the city, two important dimensions of urban life: economic and social forces. Land uses alongside some of the streets are also an important reason behind their prominence on the maps, which is an economic force. Princes Street is the centre of shopping and also different kinds of businesses. Lothian Road is a concentration of entertainment and cultural land uses, some of which, like the Filmhouse and the Usher Hall are also mentioned on the maps.

Location and architectural design are the major reasons behind the drawn objects on the cognitive maps. Most of the urban elements are drawn on the cognitive maps are physically and spatially outstanding in the area. But this dominant architecture, which is supported by the central location or dominant geographical site, should itself be considered as the outcome of other underlying forces like political (Castle), or cultural (Art Galleries, Scott Monument) or economic (Train Station), in the city's process of transformation.

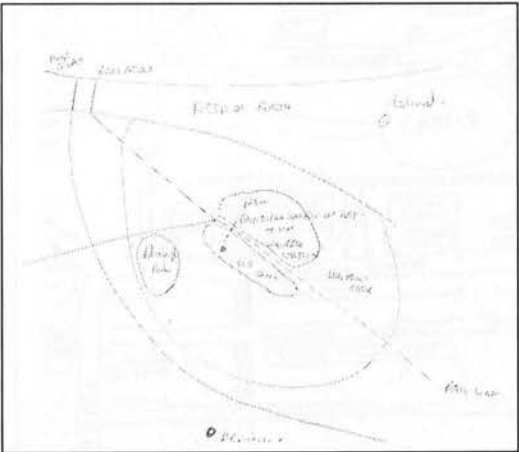
The point is that the ability to remember the urban structural elements is related to the intensive use of them as well as their visible characteristics. A witness to this claim is St. Giles cathedral, a physically dominant building, but now one of weak functional importance. It is not mentioned on the maps even once.

Respecting historical character of buildings and places is a significant force in retaining high position in the citizens' cognition. The Castle is spatially and geographically dominant, but its historical importance reinforces its position within the city main structure. It is a symbol of national identity. Historical and cultural value are the reasons are dimensions or underlying forces behind most of the features or objects mentioned, followed by social and entertainment value. For the streets, the economic and social forces seem more effective, derived from their functional role in the city structure.

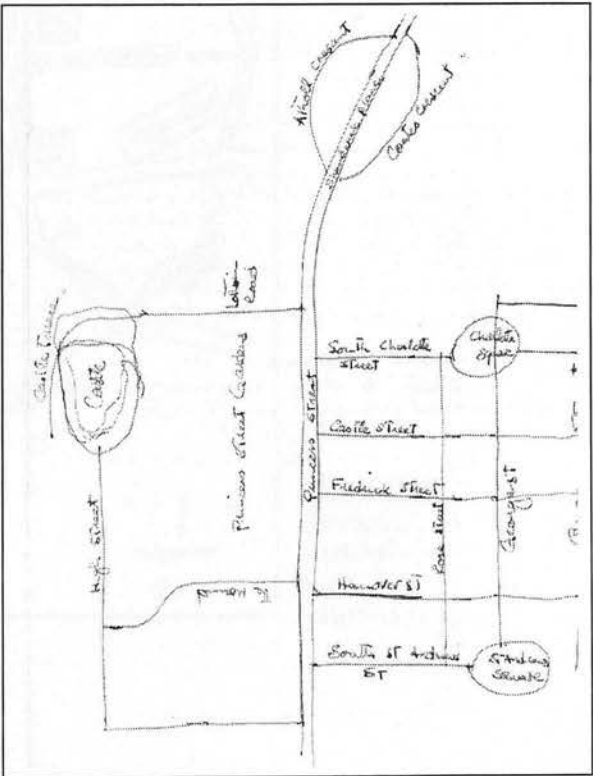
A considerable notion reflected on the structure of the maps and the mentioned objects is the clear spatial pattern and juxtaposition of its main axes and landmarks, which co-ordinate the conceptualisation the city structure. This quality is a result of laws of composition in the structure of the city transformation that has constantly organised the places and urban functions in the city structure. The stable and continuous centrality of the city main structure has engraved it on the common memory of the society.

Twelve people (40% of responds) recognised the historical importance and spatial organising role of the two poles (Castle and Holyrood Palace), at the two ends of the main axis of (High Street and Royal Mile) in the process of structuring of their city main structure and its clarity today (figure 6-15c). The clear and simple ordered New Town seems also helped people in conceptualising the structure of this area. Almost 60% of the responders could remember this formal pattern and drew it on their maps.

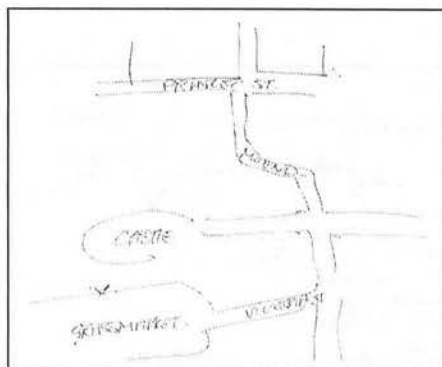
The cognitive maps drawn by people are a perceived city and contain their core assumptions about their city structure and its main structure. These core assumptions are even clear on the structure of the maps. The property of centrality of the city main structure, allocates the city main structure at the geographical centre of more than 80% of the maps (figure 6-16c).



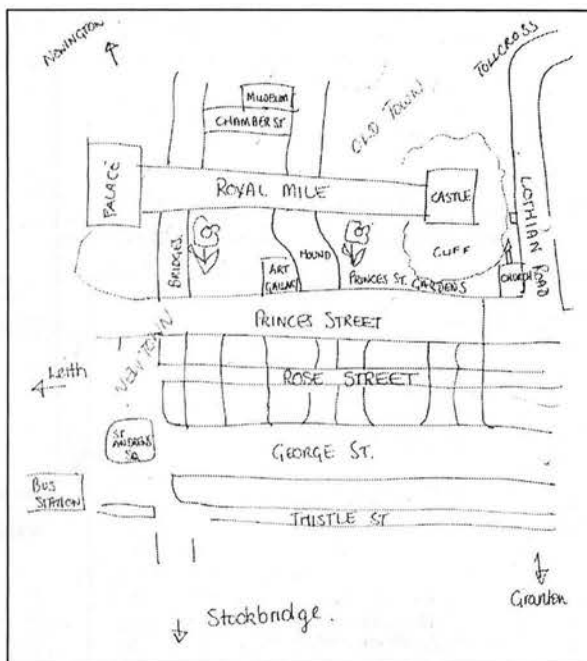
**Figure 6-1c:** Cognitive map showing the whole Edinburgh city structure



**Figure 6-2c:** Cognitive map showing how people focused on the Edinburgh main structure area



**Figure 6-3c:** A *basic* cognitive map of Edinburgh



**Figure 6-4c: A *sufficient* cognitive map of Edinburgh**



**Figure 6-5c:**  
An example of  
*complete* and  
*sophisticated*  
cognitive map



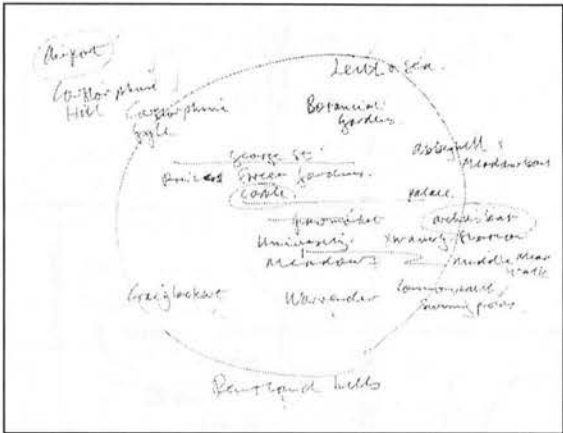


Figure 6-6: An example of fragmented cognitive map of Edinburgh

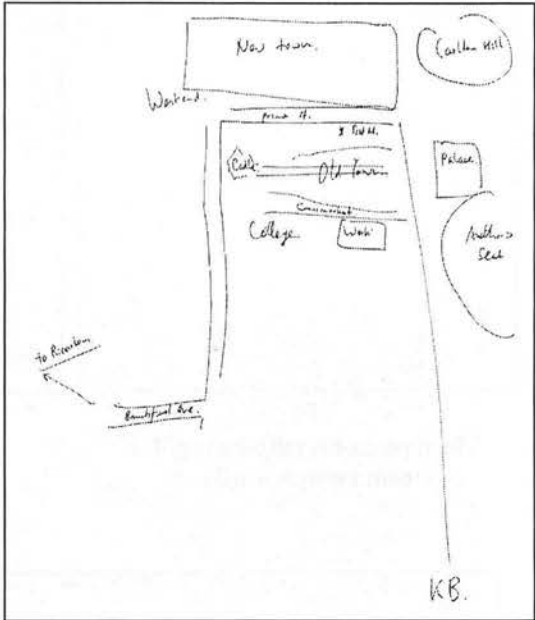


Figure 6-8: A linked version of sequential-spatial cognitive map of Edinburgh

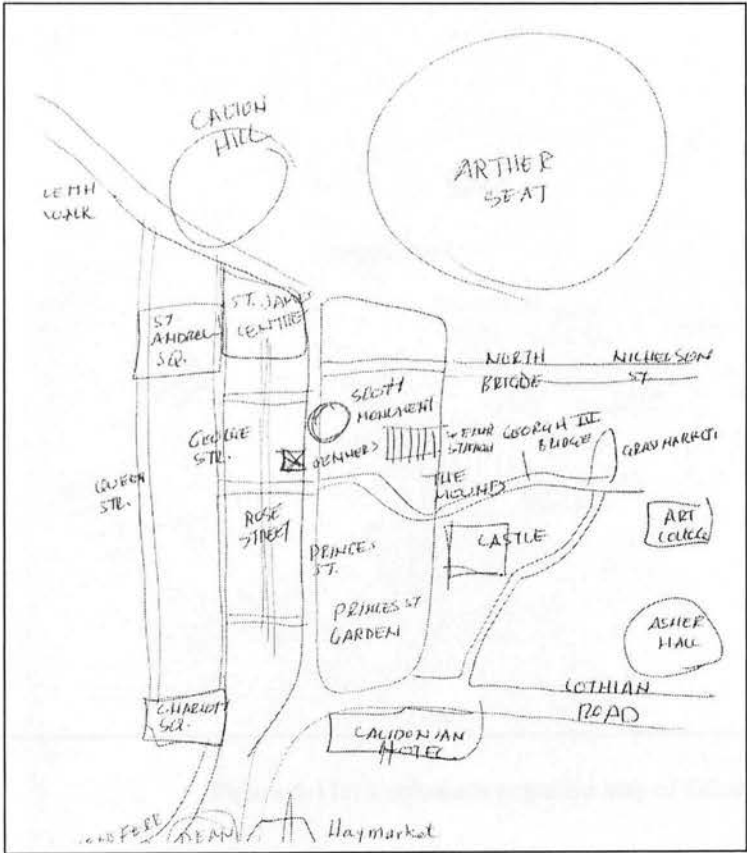
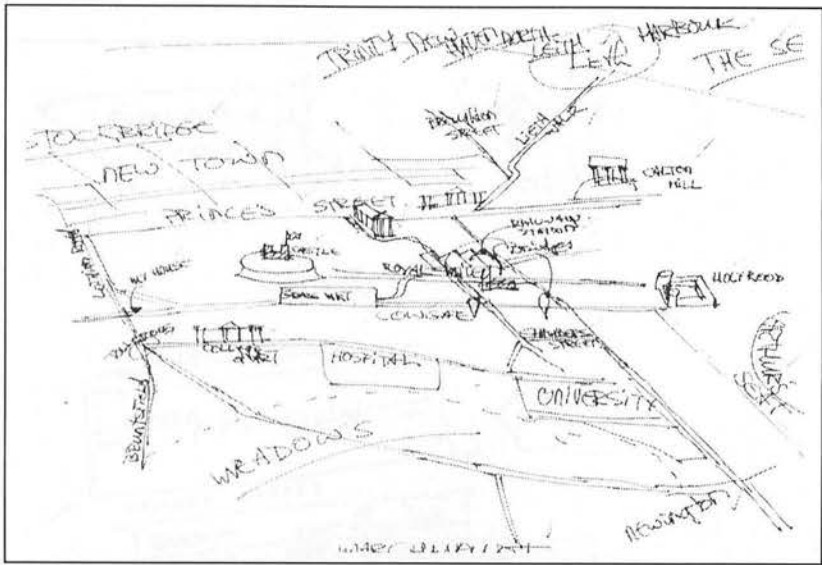
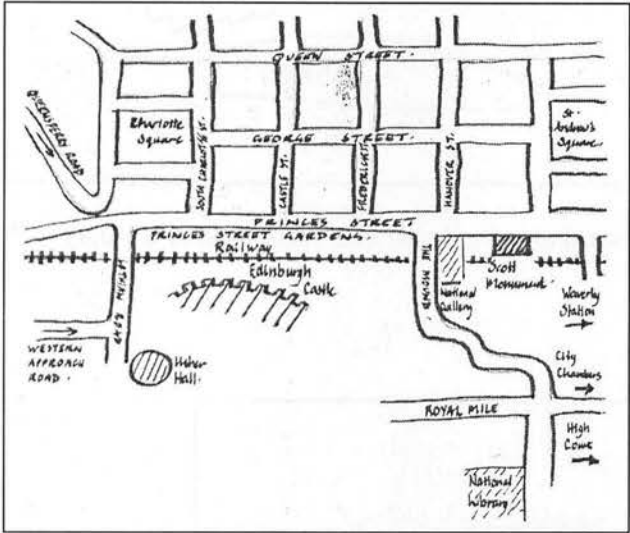


Figure 6-7: A mosaic version of sequential-spatial cognitive map of Edinburgh

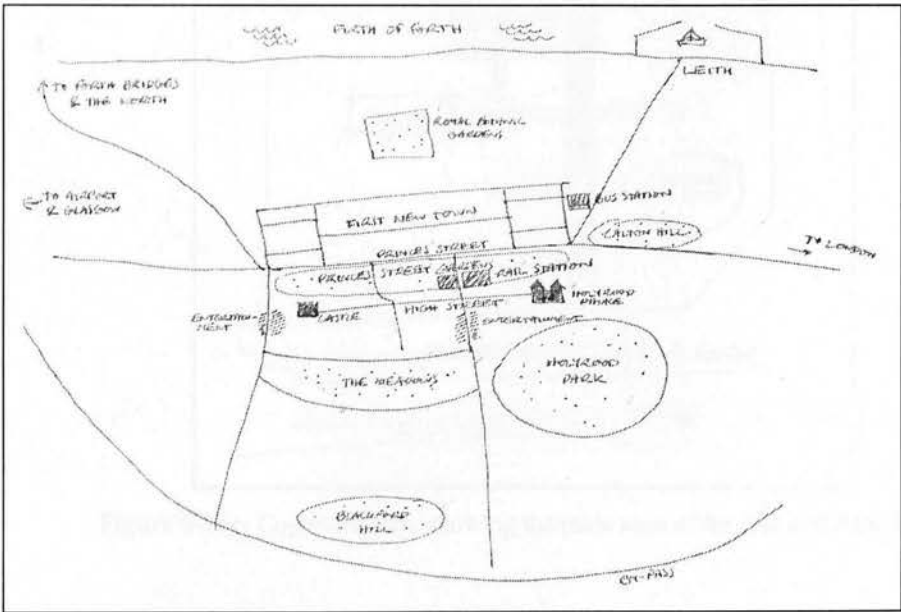




**Figure 6-12c:**  
Three-dimensional  
version of sophisticated  
cognitive maps



**Figure 6-13c:** A schematic version  
of sophisticated cognitive maps



**Figure 6-14c:** A schematic version of  
sophisticated cognitive maps of the  
whole city structure

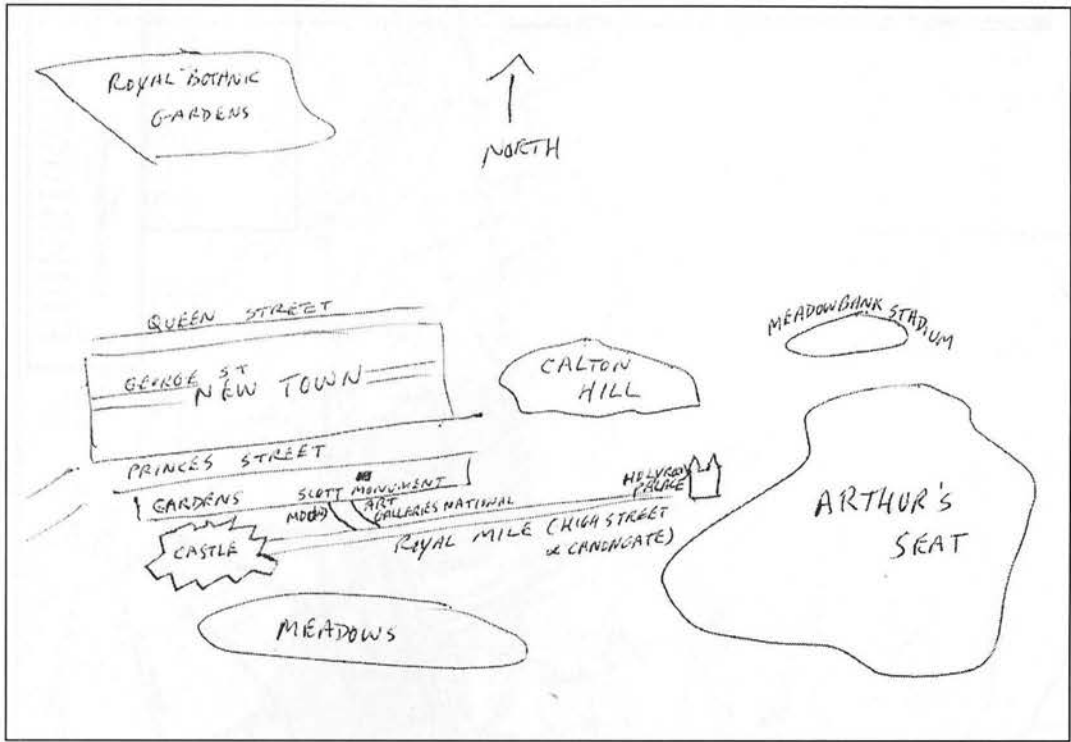


Figure 6-15c: Cognitive map, showing the main axes of the Old Town and its two poles

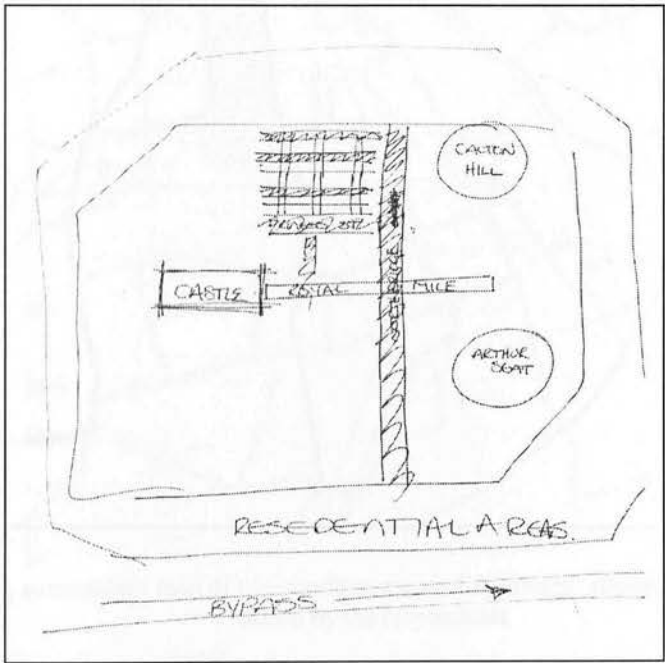
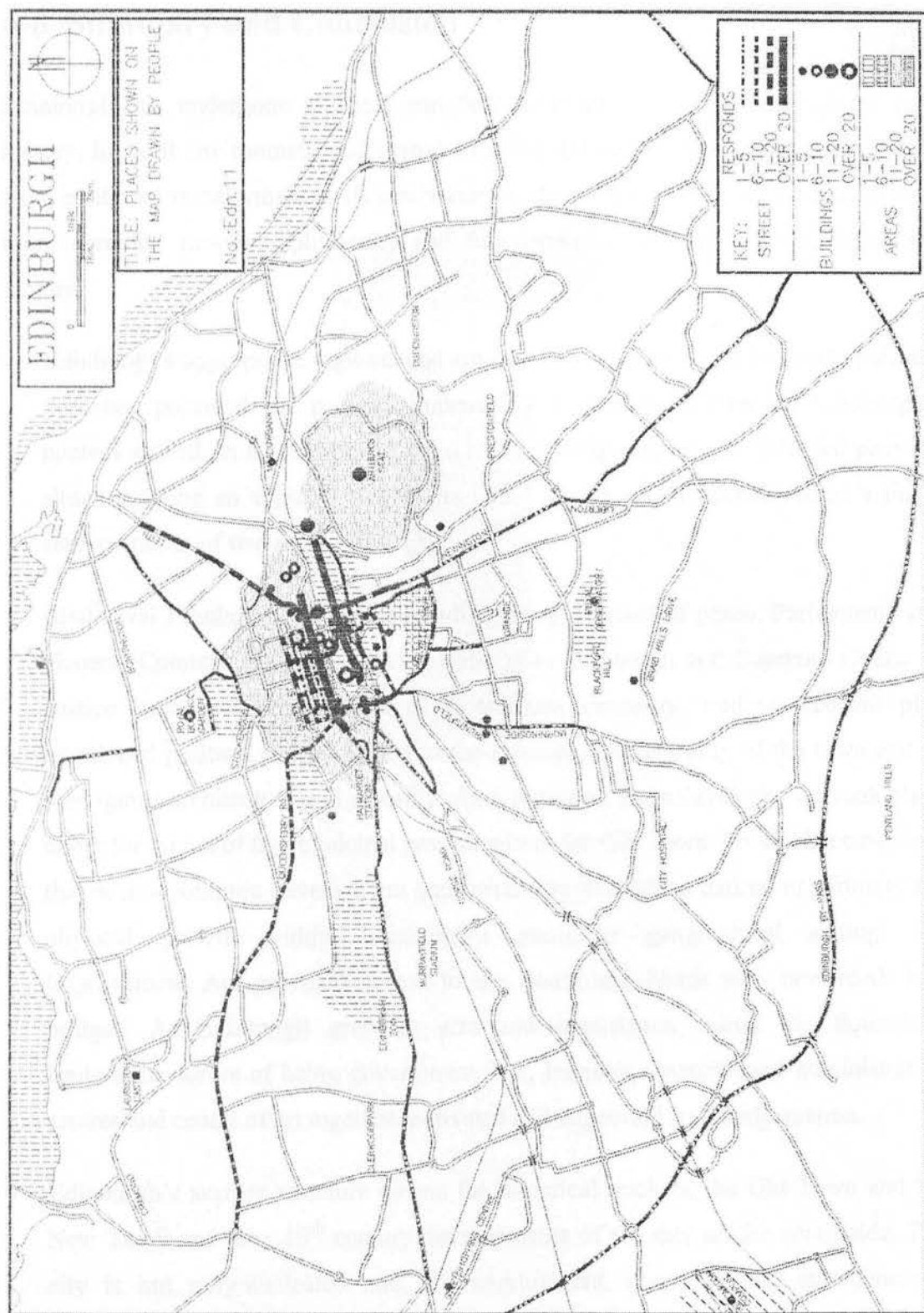


Figure 6-16c: Cognitive map, showing the main axes of the Old and New Towns



**Map 6-7:** A summarised map of the cognitive maps of Edinburgh showing the whole places drawn by the respondents



## 6-6 Summary and Conclusion

Edinburgh has undergone physical and functional transformations through its long history. Its built environment and spatial structure did not arrive by sudden design but from continual transformation. Its structural transformation passed from a simpler to a more complex structure, physically and functionally based on following important factors:

- Edinburgh's appropriate regional and environmental situation for trade and political influence provided the primary impetus for a growing settlement. Edinburgh's nucleus settled on a strategic site on a rock, transforming of the restricted physical situation along an adjacent ridge. The Old Town originally developed as a linear settlement out of two separate burghs.
- Mediaeval Edinburgh developed rapidly during a period of peace. Parliaments and General Councils assembled their meetings in Edinburgh and Supreme Courts of Justice became centralised there. Flourishing economy, trading freedom plus mentioned political prosperity led to the upsurge and centrality of the town and to prestigious architecture and urbanity. As a response, large developments took place under the watch of the municipal powers within the Old Town. Soon it became clear that socio-economic development and increasing population had no opportunity for physical growth within Edinburgh's particular geographical setting. An Improvement Act provided access to the South and North with new roads and bridges. As Edinburgh grew in size and importance, social life flourished. Underlying forces of being government, law, learning, financial and administrative centres and centre of art together motivated and supported its transformation.
- Edinburgh's surface structure covers the historical nucleus, the Old Town and the New Town and later 19<sup>th</sup> century developments of the city on the south side. The city is not poly-nucleated and, for employment, shopping and entertainment, strongly relies on the central core. Mixed-pattern surface structure of Edinburgh resulted from different phases of growth. The Old Town has a strong spine with a *fishbone* street pattern of narrow closes, leading from Royal Mile. It is woven to its First New Town, a formal symmetrical grid of orthogonal streets with a different character, by bridges, streets and various urban functions.

- Edinburgh's main structure can be considered as a focal point, as the greatest concentration of buildings and city-wide activities, which presents a strong visual experience of its history and identity.
- The functional character of Edinburgh's main structure is a consequence of different underlying forces interaction. Its mixed land-use pattern comprises of administrative, commercial, social, cultural, educational and health services, and religious, political and entertainment versus which has made the area active and alive, although different dominant land uses could be recognised in sub-divisions.
- Organic and planned evolution could be recognised during different stages of Edinburgh's structural transformation. The early period was a planned growth, relying on a centre of (political and religious) power and consisting of two nuclei (the Castle and the Holyrood Abbey). The second phase of growth in the Old Town driven by the two poles of both ends of the main axis, provided a powerful line of energy to support the growth of the spine of the town's structure and reinforced the linear pattern. Increasing internal energy of growth eventually threw off the restricting shell of the town walls from inside when it had reached the physical threshold of modification from within. This allowed the third stage of development pattern, a planned growth, building the New Town. A gradual development replaced with increasingly rapid progress as a result of homeostasis structural property. The functional deterioration was, mostly residential, was left within the Old Town, until a renewed interest in it started a new phase in improving its urban life quality. The fourth phase considered as a unification of the previous stages of the growth, is again the gradual but planned transformation in an outward radial pattern branching off the main roads from the centre towards different parts of the city. New axis of commuting worked as the main lines of growth.
- Regarding its functional transformation, while the Old Town remained the centre of legal, municipal and church administration in daily contact of many groups of the society, the New Town was a place for people to live in and work in. By gradual functional transformation, the official and shopping functions of the First New Town were reinforced.

- Organised the Old Town today control new phases of functional transformation, to keep all parts of the main structure in balance, functionally and physically. Renovating the historic fabric and bringing people back to the area, responded to economic forces but also tried to provide a location for entertainment, business, a centre for civic, institutional and cultural activities, and a place to live.
- Structural transformation in Edinburgh is a process resulting from interactions between the underlying forces. Political forces - defence in the first stages - benefited from the topography. The spatial forces manifested in the form of land limitation, put the emerging city under unsustainable population process, *i.e.* social-economic forces, a culminating in the construction of the New Town. Historical forces limited the physical and functional changes within the old parts of the city structure but at the same time gain additional value - culturally and economically- for the whole city.
- Growth in Edinburgh in the 19<sup>th</sup> and 20<sup>th</sup> century has been more influenced by planning intentions of the economic and social demands as underlying forces of the city deep structure.
- Different forces of change in Edinburgh caused physical and functional characteristics with varying degrees of resilience. Land-uses are usually the least permanent and respond most quickly to new demands. When the town developed its administrative centres, housing was replaced by municipal or commercial buildings. But the street plan has been largely indelible, altered only through government activity.
- When the major change of making the New Town happened, the whole configuration changed physically and functionally. Since the new addition contained the germ of life, it became seed for future transformation. The development in the city centre hasn't destroyed the old city main structure because didn't dry out the life stream of the overall old urban system. Equilibrium now exists between the two main parts of the city main structure in term of physical and functional transformation. As the old main structure characteristics moderated to be able to respond to new demands, the main structure hasn't collapse

- Through its growth, the city has increased its centrality. The efficacy of the central areas has never deteriorated. It has remained highly accessible and, more or less, the centre of gravity has remained at the original centre. This reinforced centrality has supported long-term sustainable structural transformation.
- The aim of economic development guiding environmental improvements in the Edinburgh Old Town has not yet reached a balance between the interests of residents, businesses and visitors. The major principle in improving the city economy should be respecting to the Old Town's historical, civic, legal, and cultural functions by achieving functional diversity, which is able to maintain such an economical stability.
- Edinburgh's expansion in the New Town is a good example of structural property of self-regulation otherwise the original city may have perished and become abandoned, because of crowding, illness, and pollution. The city as an entity decided to self-regulate the pattern of growth and transformation using its internal resources, to increase its complexity not only physically but also in culture, administration and financing.

From these points the author can conclude that the main structure of Edinburgh an example of locating a balance between destruction and preservation, which all together form the final manifestation of the city main structure. It balances the planned changes with the need for continuity in stability of the city structure and the urban life. End stage or transformation has been followed by structural modification. Based on structural property of self-maintenance and implying qualitative as well as quantitative changes within the city structure.

Recent developments in the city are motivated by an imbalance towards economic forces that has caused imbalance in the city structure because the changes no longer rely on indigenous responses. Political power has also been very effective recently. The New Scottish parliament is the symbol of political power, which would add protection and monitoring to the system structure of the city, with a great influence and support of the structural transformation. Having political independency or authority means that new source of energy is going to be injected in the structure system of city to speed up the

transformation because the parliament give energy by decision making on all other aspects of underlying forces in the urban structure and the society.

## Chapter Seven

### Case study

#### Isfahan



# Chapter Seven

## Case study Isfahan

### 7.1 General Historical Review

#### 7.1.1 Geographical Location

Isfahan is capital of the province of the same name, 350 km from Tehran by road, 100 km and railway line. Situated by the Isfahan Plains on the left bank of the Alvand plain, it stands in a wide and fertile valley, with a good water supply for the Zayandeh Rud (36 km long) and the Chahar-Bagh River (10 km). It is surrounded by the

## **Chapter Seven**

### **Iranian Case Study (Isfahan)**

#### **7-0 Introduction**

The main purpose of this chapter of study is to explore the connections between the deep and surface structure by defining the structural properties of the city main structure following the structuralist ideas. For the purpose of testing the concepts of structuralism on a city, Isfahan provides the second case study. The methodology applied in this chapter is the same as for Chapter Six, the case study of Edinburgh. The structuralist properties of the structure are recognised through considering the deep structure of the city and its underlying forces by observing how they are demonstrated on the surface structure.

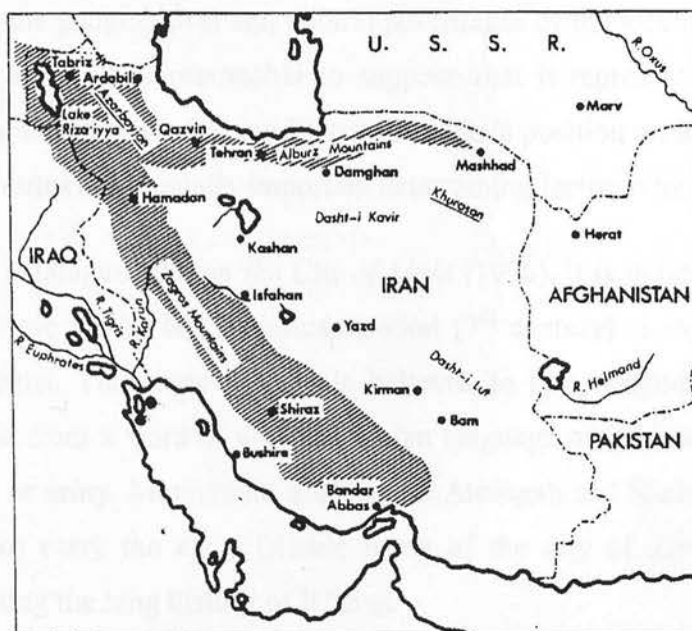
In this chapter, the results of an open-ended questionnaire method is also analysed and complement the study by considering the people's perceptions about their city's deep and surface structure. The questionnaire did not only concentrate on the built structure but also on deep structural properties by asking people to cite the reasons behind the entity of the city main structure. Finally using a cognitive map technique, the respondents were invited to draw a sketch map, showing how they understand their city as a whole.

#### **7-1 General Historical Review**

##### **7.1.1 Geographical Location**

Isfahan is capital of the province of the same name, connected to other cities by main air, road and rail routes. Situated in the Iranian Plateau on an immensely fertile riverside plain, it stands in a wide and fertile valley, with a good water supply, for the Zayandeh-Rood (the well-named *Life-Giving River*) flows through it. It is dominated by the

Zagros Mountain Range to the west. At an attitude of 1585 meters, it has a moderate dry climate (figure 7-1).



**Figure 7-1**  
Isfahan location in Iran  
Plateau

Life in Isfahan has always been connected to Zayandeh-Rood River. This runs 360 km, yielding the greatest benefit to the plain of Isfahan, irrigating agricultural lands, also feeding the growing industries. Water and soil fertility have had an important role in forming the city and its growth.

### 7.1.2 Political, Social, Cultural, Economic Evolution

For the historical review of Isfahan the author divides its development into five important periods, using the most common division amongst different documental literature sources give reference. These periods are classified as:

- Isfahan Before Islam (before 664 AD);
- First centuries after Islam (664 -1000 AD);
- The Seljuk to the Safavid period (1063- 1598 AD);
- The Safavid period (1598-1722 AD); and
- After Safavid to the Modern period (Ghadjar and Pahlavi dynasties, 1722 AD until now).

### Isfahan's early period, before Islam (up to 664 AD)

The question of when and by whom the city was founded is not an easy one to solve. Given the geographical and natural advantages of the location of Isfahan by Zayandeh-Rood River, it is reasonable to suppose that it represents one of the earliest urban developments in the Iranian Plateau. Isfahan's position on the main communication and trade routes is an equally important determining factor in its selection for an urban site.

In the catalogue *Isfahan the City of Light* (1976), it is indicated that information on the prehistoric to the late Sassanian period (7<sup>th</sup> century) is extremely scarce, although it does exist. The name *Isfahan* is believed to have originated in the Parthian period, derived from a word of ancient Persian language of Pahlavi, which mean a place for a *Sepah* or army. Monuments such as the Ateshgah and Shahrestan Bridge (3 km east of Isfahan) carry the early Islamic name of the city of *Jay*, as well as few artefacts, indicating the long history of Isfahan.

During Parthian time (249BC–226AD) Isfahan was already the capital of a large province, the seat of government satraps. Under King Ardashir and his successors Isfahan continued to be an important administrative centre.

The oldest part of Isfahan was called *Jay*, a name that was later changed to *Shahrestan* or *the Township*. Subsequently, a number of Jews were settled some two miles to the north-west. Opinions differ as to the origin of the Jewish town, *Yahudieh*.

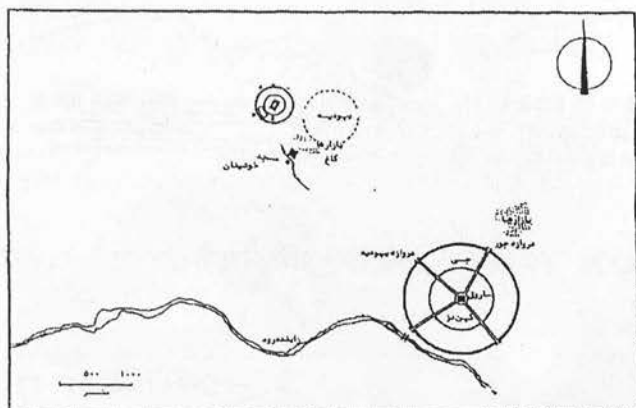
Abu-Nae'im (1038 AD), in the introduction of his book, *The Isfahan News* claims that *Jay* was founded in the period of Sassanian dynasty (531 BC). It was a circular city with four gates. Ibn Ruste (987 AD) refers to an old citadel there and to documents written in Pahlavi, which was founded there, and reveal it was a governmental centre for that region. Abu-Nae'im (1038 AD) mentions a market place around northern gate or *Khur*. The location of this regional market was important because it reveals that the rural people went there to trade their agricultural products.

### First centuries after Islam (Abbasid period, 664 -1000AD)

Isfahan itself surrendered to the Arabs in about 664 AD, after a series of battles had been fought in the neighbourhood. After Islam, *Jay* was occupied but *Yahudieh* was spared this fate because it was a poor town. The changeover from Sassanian rule to that

of the Caliphate favoured rather than retarded the development of Isfahan, which was made the capital of the province of Al-Jibal. The city speedily recovered and became famed for the quality of its textiles and metalwork.

The geographer Ibn Ruste (987 AD), a native of Isfahan, described Jay as being half a league in diameter and having four gates. Inside the town was an ancient fortress called the *Saruq*. Until the beginning of the tenth century, Jay and Yahudieh were still separate towns, but the moment of fusion was drawing near (figure 7-2).



**Figure 7-2:**

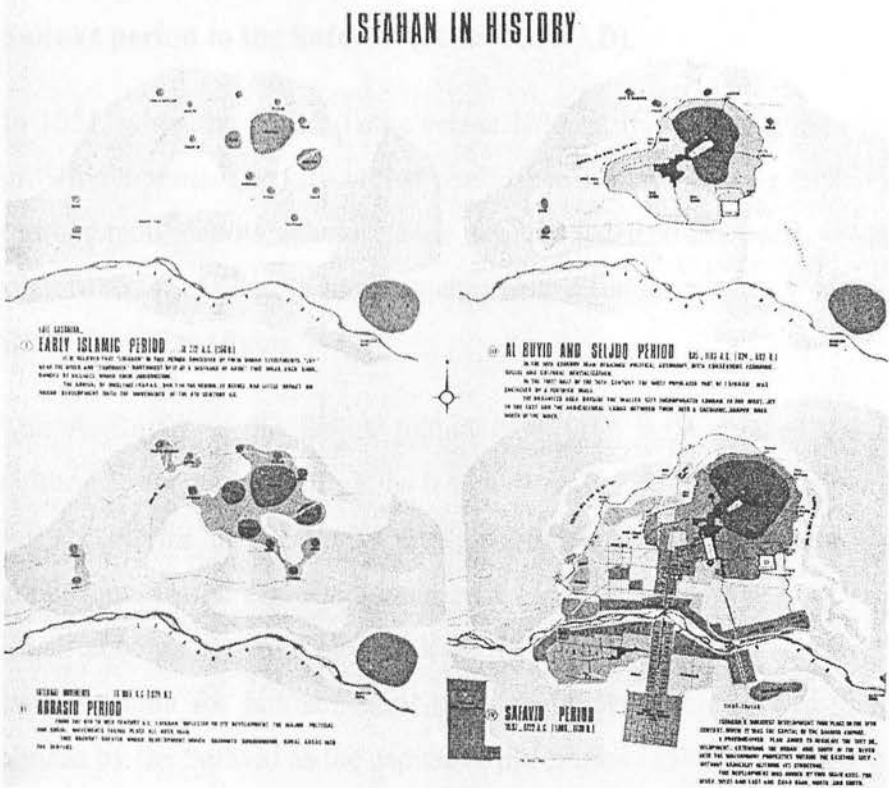
Isfahan in Sassanid and early Islamic period (until the 8<sup>th</sup> century)  
The circle below shows the place of Jay and the dotted circle above shows Yahudieh

*Isfahan, the City of Light* (1976) refers to early Muslim geographers who describe in some detail features and characteristics of the city and, from this information, its basic configuration has been roughly determined. It is believed that Isfahan in this period consisted of twin urban settlements: Jay near the river and Yahudieh north-west of it at a distance of about two miles. Each was surrounded by villages under their own jurisdiction (figure 7-3).

Gaube (1978), following the evidence of Muslim Arab historians and geographers writes, that there were in the whole region around Isfahan, two small towns of Jay and Yahudieh in the 7<sup>th</sup> century. After Arab occupation a Friday Mosque was erected in Jay because it was a safe place. In mid the 8<sup>th</sup> century the centre of government relocated to a little town between Jay and Yahudieh called *Khuzainan*. Today Isfahan stands on old Yahudieh. Nothing but ruins remains of Jay, to the south-east of Zayandeh-Rood. Later a bazaar was brought into being in the suburb of Khuzainan in front of Yahudieh. After a short time this area became joined to Yahudieh by the growth of its buildings. Although this new town competed with Yahudieh as an official centre it was finally absorbed within it. Yahudieh continued to grow and the third Friday Mosque was erected before the end of the 8<sup>th</sup> century in the place of the existing Friday Mosque in



Isfahan. Coins found in that area confirmed the relocation of governmental activities from Jay to Yahudieh.



**Figure 7-3**  
Four phases of Isfahan growth

(From left to right and top to bottom)

- 1: Early Islamic period
- 2: Abbasid period
- 3: Seljuk period
- 4: Safavid period

**Source:**  
Isfahan, city of light

Nagsh-e-Jahan Pars consultant Engineers (1992) write that Jay was a governmental centre and Yahudieh was a residential area for ordinary people. After the Arab invasion Jay changed into a place for all groups of people. These two rural nuclei, which used to be separate because of natural, economic and cultural differences, later joined together to be the nucleus of a congested city.

In due course the two towns grew to such an extent that they coalesced to form one large city, but this fusion did not occur until about the tenth century AD. The name of Isfahan had, however, already been applied jointly to the two towns for some hundreds of years.

In the Abbasid period from the 8<sup>th</sup> to the 10<sup>th</sup> century AD, Isfahan reflected in its development the major political and social movements taking place all over Iran. This brought greater urban development, which absorbed the surrounding rural areas into the centres. This has been supplemented by recent important discoveries in Shahrestan and in the Masjed-e-Jom'eh (Friday Mosque) of Isfahan. During the next century, the city

came under the rule of the Al-Buyid, a purely Persian dynasty through which Isfahan became very prosperous. From the 8<sup>th</sup> century Iran regained political autonomy, with conceptual economic, social and cultural revitalisation.

### **Seljuks period to the Safavid (1063- 1510 AD)**

In 1051, when the Seljuk Turks seized Isfahan, they made it the capital of their rapidly growing empire. The city at that period had Friday Mosque, bazaars and caravanserais (commercial depots where goods are unloaded from pack animals). This dynasty established a Maidan (a main square) in the centre of town to accommodate all major urban functions (figure 7-3).

The Al-Buyid to the Seljuk period (935-1186 AD) marked the greatest social and cultural fermentation in Iran, as it is written in *Isfahan, the City of Light* (1976). After three centuries of prosperity and progress Isfahan faced many changes and chaotic conditions. In the early 13<sup>th</sup> century it lost a significant part of its population and its importance as a major city of Iran. The following three centuries were a period of marking time for Isfahan, until once again, its potential was recognised and it was chosen by the Safavid as the capital of the empire (1597-98 A.D).

Towards the end of the first quarter of the thirteenth century, the terrible Mongol hordes invaded Persia and they captured the city. In the interval between the dynasties of the Mongols and Il-Khans and Timurids, much building in and around Isfahan was carried out. In 1388 Timur Lang (Tamerlane) captured Isfahan, but spared it and its inhabitants.

According to H. Gaube (1978), from the mid twelfth century, after the decline of the great Empire of Seljuk, Isfahan went through an economic recession.

### **Safavid dynasty (1510-1722 AD)**

With the advent of the Safavid dynasty at the beginning of the sixteenth century, the fortunes of Isfahan took an upward turn. Although Shah Isma'el (1510-24), the first of the new line, made Tabriz his capital, he often visited Isfahan, where he laid out the spacious park known as Nagsh-e-Jahan (The Picture of the World).

Although Shah Tahmasb was no builder, he thought enough of Isfahan to endeavour to improve its water supply by means of what was known as the Kuhrang. The Golden

Age of Isfahan began afterwards in the reign of Shah Abbas the Great (1587-1625). The situation of the city, its good climate and, above all, its distance from any frontier, led him to transfer his court permanently there from Qazvin in 1598. He re-planned and largely rebuilt the city.

When Isfahan became the capital of Iran in 1587, it was the scene of a counter-play between incremental growth and conscious planning, growing by accretion over the centuries. When Shah Abbas came to power, he introduced grand scale planning by building Maidan-e-Shah as a spectacular display of his power. Years before, probably under Shah Isma'el (1502-54), the Maidan had been moved from its previous location near the Friday Mosque to its present location, as an expression of the physical and symbolic separation between the clergy and the ruler.

Shah Abbas' greatest achievement in Isfahan is undoubtedly his creation of the magnificent monuments that still grace the Maidan-e-Shah (figure 7-4). In this task he consciously or unconsciously copied what the Seljuks had achieved five hundred years earlier around the *Maidan-e-Kohneh* or Old Square; like them he believed in having a fitting centre for his capital city. With the death of Shah Abbas in 1629, the decline of the Safavid empire set in; long before the process of decay became manifest, Isfahan continued, until the fall of the Safavid dynasty in 1722, to be the great metropolis of the empire.



**Figure 7-4:**  
Nagsh-e-Jahan or Maidan-e-Shah

**Source:**  
M. Ali Asgari

Gaube (1978) also refers to one of the most important actions by Shah Abbas, which was constructing a new district called *New Julfa* in the southern area of Zayandeh-Rood River. In order to encourage trade and industry in Isfahan, Shah Abbas decided to transfer several thousands of Armenian inhabitants to a site on the south side of the Zayandeh- Rood, the Armenian suburb of Isfahan. Not only did he allow them to build their own churches and freely to practice their religion, but also gave them permission to appoint their own mayor (figure 7-5).



**Figure 7-5:**  
Julfa, the Armenian district

**Source:**  
M. Ali Asgari

It may be asked what was the size of Isfahan at the zenith of its fortunes. The estimates range from 500,000 to well over a million people. Chardin said that Isfahan was as populous as London, which then had 670,000. According to Chardin, Isfahan had, at this time, 162 mosques, 48 colleges, 273 baths, no less than 1800 caravanserais and 12 cemeteries. In the Safavid period, Isfahan covered 80 square kilometres (Mirmiran, 1988).

*Freyer in 1677 declared that few cities in the world surpass Isfahan for wealth, while none come near it for its stately buildings (A. Rapaport, 1964-65, p. 5).*

Although Isfahan's greatest development took place in the 17<sup>th</sup> century, as mentioned in *Isfahan, the City of Light* (1976), with the end of the Safavid dynasty (1722AD) a



depressing vacuum occurred, which brought the city to the verge of complete collapse (figure 7-3).

### **After Safavid to Modern period (Ghadjar and Pahlavi, 1722 AD until now)**

From 1720 to 1722 Persia suffered a series of shattering blows from the Afghans, the Turks and the Russians. Isfahan has never fully recovered from the combined effects of these sieges and massacres, in which over nine-tenths of the population lost their lives. Moreover, large areas of the city were razed to the ground. Although parts of the city are still desolate, much has been rebuilt and new suburbs have come into being.

During the next dynasty or Ghadjar, the city encountered recession and deterioration. The most important reason was economic because most rich people emigrated to other cities like Tabriz and Tehran (Mirmiran, 1988).

In the Pahlavi period, Reza Shah incited the city to modernism and the industrialisation. Isfahan was one of the cities that had been most heavily influenced by the Iranian industrial evolution and its economy was highly related to industries like its huge metal foundry. The city experienced rapid growth since then and now is the second most important city in Iran (Mirmiran 1988) (figure 7-6 a & b).



**Figure 7-6 a:**  
Isfahan's growth in the  
20<sup>th</sup> century, in three  
periods of 1920s, 1950s  
and 1980s

**Source:** S. Shafaghi ,  
Isfahan University





**Figure 7-6 b:**  
Isfahan in 2000  
**Source:**  
Isfahan comprehensive  
plan

Isfahan, as one of the oldest functioning cities in Iran with a population over 1,250,000, is now the second major city in Iran after Tehran, the capital. Isfahan's deep structure is partly based on its administrative role as the centre of Isfahan province, now an industrial area although agriculture is still very important in the economy of the region and the city. The city is the centre of trade and art and education within central Iran and is of national importance. It houses masterpieces of Iranian Islamic architecture and urban design, and has a historical significance throughout the world.

## 7.2 The City Main Structure

Isfahan is an example of a city with a long and remarkable history. It has undergone many huge transformations promoted by a set of underlying relations between different forces that are manifested on its visible characteristics and its urban elements. The deep structure of Isfahan has absorbed various events and transformed them into its urban life by its main structure. Structural properties played a role in this long process to stabilise the urban life and its surface structure. Some of the structural properties that are most identifiable in the process of transformation of Isfahan are:

- The property of *wholeness* that makes the whole area of this historic city main structure remarkable focal point, with a set of symbolically important and visually dominant nodal points within a network of everyday activities;
- The property of *hierarchy*, that characterises the area into appropriate land-uses that provide services for the entire city as well as its region;
- The *laws of composition*, that ordered major urban functions in a physically compact area with the highest diversity urban activities;
- The property of *dynamism*, which can be traced in highly populated area, with high levels of movement and traffic as a result of mixed land use and various urban activities;
- Although the historical parts of the city suffers from modernisation, the existing importance of some major structural elements is a sign of the property of *self-maintenance*;
- *Self-regulating* structural property which is manifested in presence and improvements and even in adaptation to new functions, particularly in some original structural elements like Chahar Bagh or the bazaar;

As it is claimed in the Isfahan Action Plan (1992), Isfahan's architecture illustrates the unequivocal role it has played in the development of Islamic civilisation. Equally important is Isfahan the city. To present the city in many aspects, and its development through the centuries, its structure and interaction with environment, as the generating force in the creation of a cultural entity, urban spaces are presented in terms of varying functions and adaptation to an underlying fundamental principle of unity.

To understand how the city deep structure has affected and shaped the lives of its people provides with a tool to protect this priceless heritage from deterioration. Thus, understanding can be used to channel the process of modernisation into a path that is holistically integrated into the natural growth of the city.

To study Isfahan's main structure, a short review of its historical evolution is given, followed by a examination of the transformation in its deep underlying forces by the study of major events that have influenced the city transformation.

## 7.3 The City Main Structure Transformation

An understanding of the transformation in the city structure in terms of its cultural, social and economic underlying forces of deep structure is necessary to find out the reasons for the physical manifestation of its surface structure.

*Historical-morphological reading, one must singles out the historical signs which remain - even assuming different roles and meanings – in the subsequent transformation of a place and which have to be identified and taken into account, because they condition the transformability of the structure of that place even in future times. The result must be a deep knowledge that must be able to understand the intricacies and stratifications of the physical structure (Firenze, 1987, p.309).*

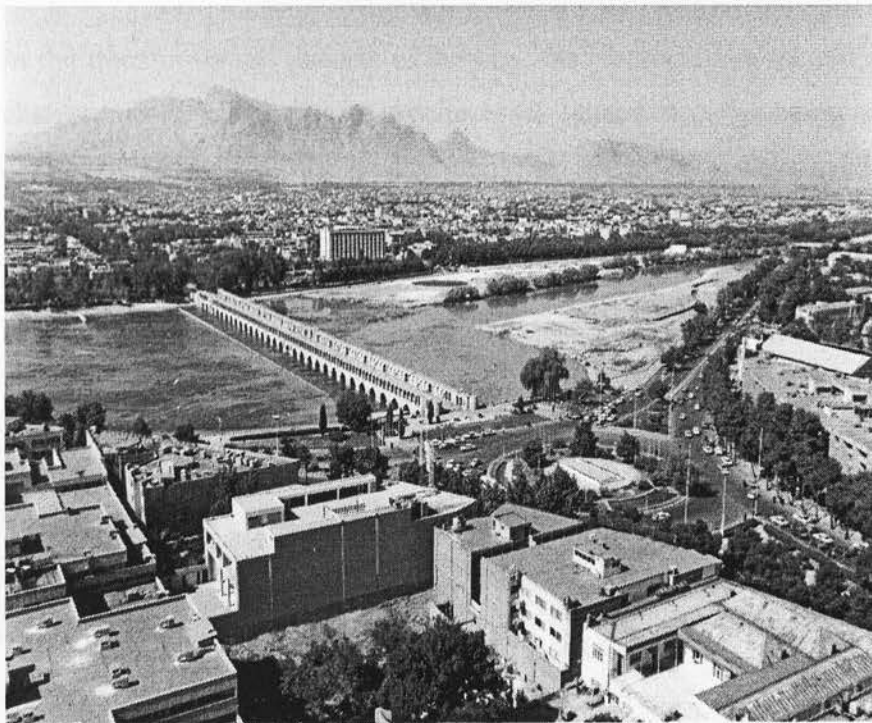
The structural transformation analysis is aimed of understanding the process from the starting point of the underlying forces, which include the processes of genesis, growth, stabilisation, stagnation and decline of the city main structures. This recognises the reflection of transformation on the dynamic spatial organisation of the urban structure and human behaviour. The important aspects of this kind of study focus on observing the consequences of structural properties in the area. The source of transformation in cities is underlying forces, which are in constant transformation because a human society's demands and desires are always in change. The surface city structure and its spatial order respond these forces. Various forces influence the process of transformation in Isfahan but in this research the underlying forces considered are geographical-environmental, social, spatial, economic, political, cultural, and historical forces. The following sections are efforts to understand these phenomena by reviewing the available historical data, complemented by a survey study of the researcher based on structural properties. This study perhaps is benefited form a number of the events and visible changes extracted from thousands of happenings in the long history of transformation in the city.

### 7.3.1. Geographical-Environmental Forces:

Isfahan's geographical location is on a flat site with a mountain area on the south. The origin of the city is formed because of the fertile riverine location.

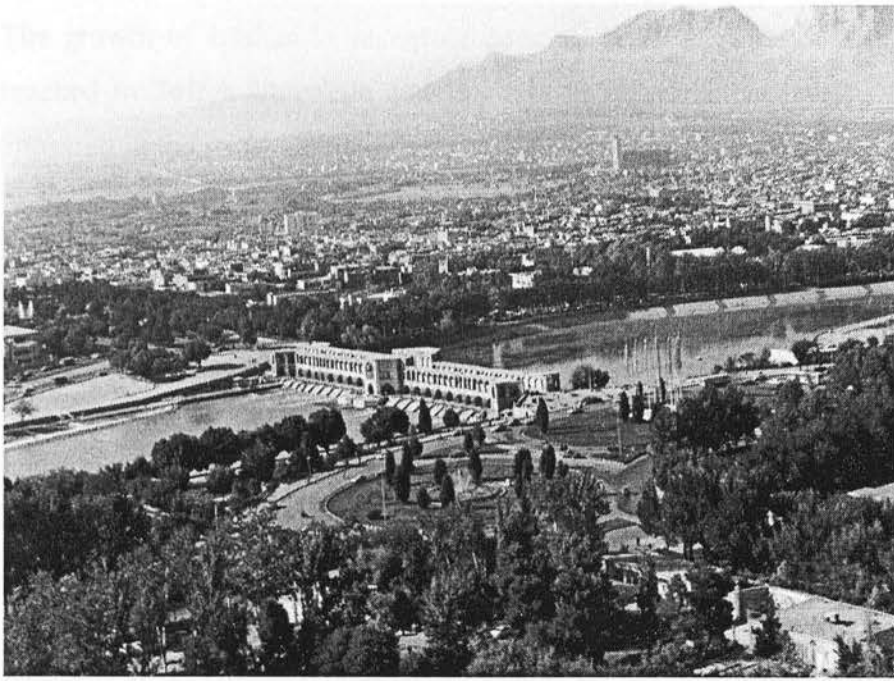
Zayandeh-Rood River is a natural potential, which has inspired city growth, for centuries. The river before the Safavid era was outside of the city. Since then it has become a part of the main structure and, even more, an important structural element of the city, woven into its main axis by bridges. The river has played a huge role in the structural transformation of the city. The city structure benefited from this potential and transformed it from being a physical obstacle in the city growth, to an attracting line of growth and this has determined much of the later organisation of the city. In the early stages the river attracted the growth toward itself and then distributed it to the lands on other side as well as alongside the river in two directions as the main axis of growth in city (Chahar Bagh) jumped over it to continue the surface transformation along a line of growth.

The bridges of Allahverdi Khan or Thirty-three Arches (figure 7-7) and Khaju (Figure 7-8) are more than mere passages from one riverbank to the other but mark the significant integration of the river into the fabric of the city and are two focal points within the city main structure, both with a structuring function. In addition to the roadway and the arcades they provide elegant pavilions on either side for the enjoyment of the view, and a lower level walkway. These two urban elements are influential in both the deep and the surface structural significance of the city.



**Figure 7-7:**  
Thirty three Arches  
Bridge  
**Source:**  
M. Ali Asgari





**Figure 7-8:**  
Khaju Bridge  
**Source:**  
M. Ali Asgari

Running west to east, the river dominates the city structure and makes water available through a system of *Madis* (canals) integrated into the whole area of the city. Monumental urban and architectural expressions culminate at city-river encounter points and intersections such as the bridges. The surface structure of Isfahan now is comprised of four main quarters which are demarcated by two main axes - the river running west-east and Chahar Bagh, running north-south.

In the transformation process of the city, the riverside and the old outstanding bridges, changed from serving semi-private royal leisure time to being a city-wide pleasant centre of recreation. Its beauty and the linear park developed alongside it have transformed it into being a visitor attraction. Even the avenues on the two sides have the potential of being centre of public activities. A natural park, *Nagenan*, to the west of the river within the city reinforces Zayandeh-Rood's axial role in the city life (figure 7-9).



**Figure 7-9:**  
Natural park of Nagenan West  
End of Isfahan  
**Source:**  
The author



The growth of Isfahan in recent decades on the south side of Zayandeh-Rood River reached to Soffeh Mountain and this now is an attractive natural element and parks appeared in the surface structure serving and the city's leisure life.

### 7-3-2 Spatial Forces

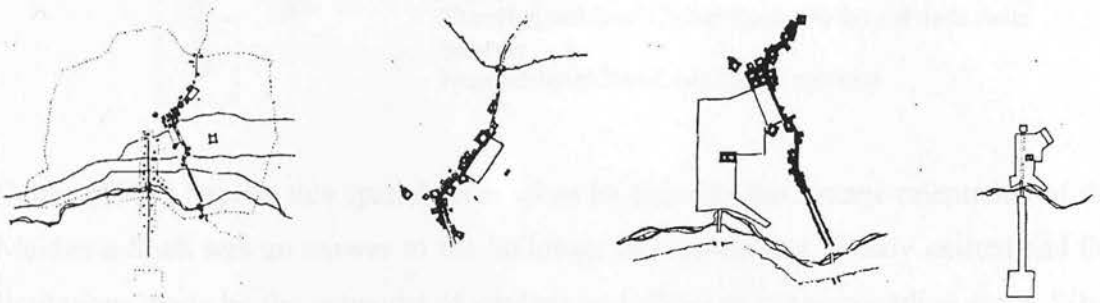
At the first stages of the city transformation, the most important spatial forces - regarding the particular forms of linear, nodal or surface - could be recognised as the linear routes between the small settlements, which was a basis for forming bazaars. The dynamism hidden in this form of force has had great influence on the formation of the first nuclei of the city structure and has nourished it in different stages of the transformation. Another spatial force was supplied by the gates as nodes where the potential of market place was reinforced. These two groups of spatial forces responded to very fundamental underlying force, the needs of the society to exchange their products (figure 7-10).

These two groups of spatial forces which influenced the direction and pattern of visible growth of the settlement, are also the sign of deep structural transformation of the city in its process of moving from simplicity to more complexity. This complexity in the deep structure of the city evoked the concept of centrality, the centrality of the political power, which always seeks its appropriate spatial form. In the Seljuk period the nodal pattern was chosen to provide an opportunity to show off the centrality of power, so the governmental functions imposed a centre in the town. The structural property of laws of composition organised the spatial force in transaction with other forces like political forces and the whole city structure took a step towards more structural complexity.

By growing the city, Maidan-e-Kohneh, which had been located on the margin, had found a central setting. A considerable aspect of the structural transformation showed itself in the new composition of the town. The centripetal spatial order of major urban elements around the maidan was placed on the main trade route of the old Silk Road, on the centre of gravity of two major crossing roads within the city. The next step in the physical transformation was the bazaar, which formed alongside these major routes. The main trade route worked as a linear force to the surface structure and the bazaar grew alongside it, so the transformation of the city structure in this period combined two forms of organic and planned structural transformation. Because the town expanded

from different directions, the physical aspect of structural property of centrality of the maidan and its elements was reinforced.

Spatial complexity as a result of structural transformation continued as the expanding surface main structure occupied the available spaces. Site availability on the growing direction of the existing main structure, is a great chance that it would be absorbed to the structural transformation and it is an aspect of the spatial force. In Isfahan, alongside growth direction of the bazaar to the south gate of the town, there was land available for the foundation of a new urban complex and Shah Abbas used this site and through a small bazaar the new maidan reached to the end parts of the old bazaar next to the city gate (figure 7-10).



**Figure 7-10:**

From left to right:

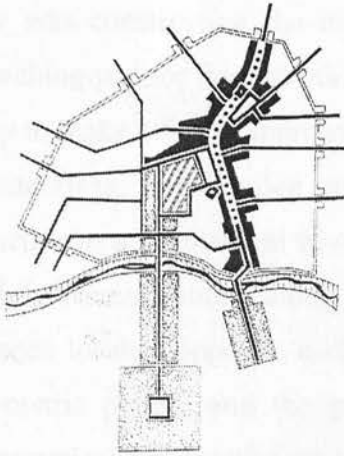
Position of the ancient trade route in the city leading from the north gate through the bazaar and over the river; relationship between Maidan-e-Kohne and the beginning of the bazaar; position of new lands available for growth in Safavid era onto the old trade route; next phase of growth crossing over the river; the conceptual expansion of the previous move to incorporate it into the Avenue of Gardens.

**Source:**

K. Herdeg, 1990, Formal structure in Islamic architecture of Iran and Turkistan

The bazaar appears in two major forms in Iranian cities. It can develop linearly, that is, along the urban main axes, or it can spread over the centre of the city. In most cases a combination of these two types occurs (Gaube, 1978). The linear configuration of the unique bazaar in Isfahan makes of it the very backbone of the city, with a governing relationship of the townscape along a 1.6 kilometre path that leads from the Friday Mosque to the Maidan-e-Shah. At the end of the bazaar, the space abruptly opens out, emerging from a dark tunnel into the light into an immense square filled with space and sunlight. This is the northern end of the Maidan-e-Shah.

This spatial composition followed the structural order of the city and so engaged in the structural transformation of the city. It was possible for a new urban axis - Chahar Bagh - to branch from it, becoming the triumphal avenue that Shah Abbas had made to lead the visitors to the heart of his city (figure 7-11).



**Figure 7-11**

The relationship of Chahar Bagh and the old trade route

**Source:**

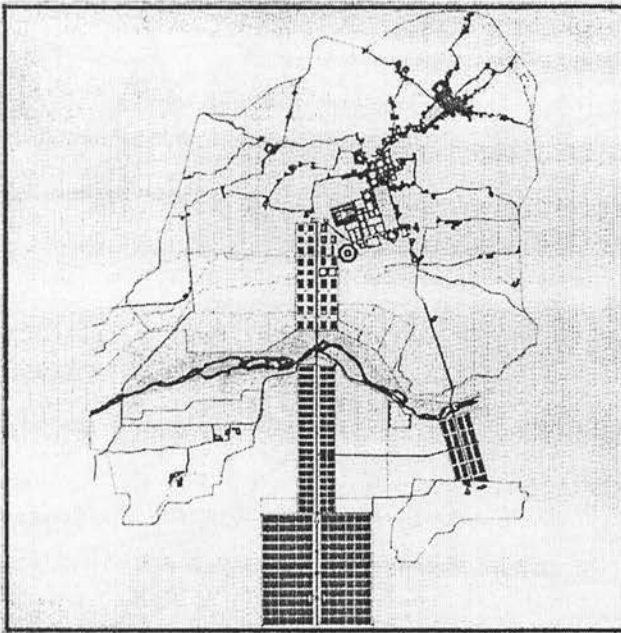
Nagsh-e-Jahan Pars Consultant Engineers

Gaube (1978) implies this spatial force when he explains the strange orientation of the Maidan-e-Shah was an answer to the buildings and streets that already existed and the limitations made by the networks of gardens and alleys of the surrounding areas. What prevented the Shah to make any other kind of decision was also the existed southern axis of the city, which is parallel with Nagsh-e-Jahan Maidan. The axis was the route for all traffic, south to north traffic. The already developed old bazaar on the axis, and the gate were the outskirts limit of the old city. This axis passed within 100 meters distance through gardens, which was around Khaju Bridge. Consequently, the available lands on the south side provided a potential for the city to grow to the south. This potential later became a basis for late stages of city growth. Growth to the north, in comparison and in competition with the south side, was always slower (figure 7-10).

After that the centre of city and nationwide activities shifted to the new maidan and the old bazaar linked two old and new city centres. These two maidans served city life side by side and supported the growth of the city. In this regard the old maidan self-maintained to resist against stagnation caused by the leaking out of power to the expanded parts of the city structure. The co-operation of these two maidans is an important event in the structural transformation of the city and the result is the greater centrality of both of them as a composite unit within the whole structure. Although structural transformation in this phase was conducted by fabulous urban planning, it was

absorbed within the city structure and even changed the growth direction of the city to the south towards the river. It should be considered as a physical manifestation of the property of homeostasis to respond to the demands of the developing society.

The completing step of this significant moment in the structural transformation of the city was constructing the main axis of Chahar Bagh that provided an appropriate launching-pad for this growth. Shah Abbas decreed the construction of Chahar Bagh not only to make a fitting approach to his new capital, but also to afford easy access from it to the Hezar Jirib garden on the south side of the Zayandeh-Rood River. The city structure as a geometrical whole was completed with the garden avenue of Chahar Bagh and the formal gardens along it. On both sides of the Chahar Bagh axis, there were two palaces located opposite each other, which closed the vista. The whole area had a geometric pattern and the gardens and the pavilions or little palaces were placed symmetrically although each had its own building design (figure 7-12).



**Figure 7-12:**  
Safavid Isfahan structure with urban thoroughfares, Chahar Bagh and the formal gardens

**Source:**  
Nagsh-e-Jahan    Pars    Consultant  
Engineers

The historical bridges known as the Bridge of Thirty-three Arches or Allahverdi Khan Bridge (figure 7-7) and Khaju Bridge (figure 7-8) are themselves spatial forces. These bridges stand today as notable monuments and are the most popular features in the city according to the respondents.



After this, the physical growth of the city main structure from different parts continued, because unhindered by any spatial obstacles. Thus the planning of Shah Abbas should be considered as the seed of a longer transformation in the city structure.

After the Safavid dynasty was overthrown and the status of capital city removed from Isfahan, the self-maintaining property of the city structure saw Chahar Bagh to the new demands of the modern era to stay stable. After the industrial revolution its gardens were demolished and little by little public buildings were built in this place but the main axis kept its importance as the spine of the city.

In the next stage of urban structural transformation, another important spatial force appeared based on the needs of motorised vehicles and street network (figure 7-13).



**Figure 7-13**

New Street network on the old texture of Isfahan

The most widespread damage to the old urban fabric of the main structure happened in order to introduce vehicular traffic to the city. Although new spatial forces emerged during this step, political forces changed the intrinsic organic transformation process within the city structure, and introducing this new spatial force that influenced the old fabric of the city in its entirety. New demands for vehicular routes within the traditional



congested urban fabric around Maidan-e-Kohneh resulted new avenues constructed more than five decades ago. These tore apart the organic integrated main structure in its oldest core and caused physical and functional damage throughout this valuable area. Although the new avenues decreased the importance of some parts of the old main structure of the city (particularly Maidan-e-Kohneh), it remained robust around Nagsh-e-Jahan and Chahar Bagh that, despite being injured by those traffic avenues, are still integrated because they had enough spatial capacity to transform themselves to accommodate demands of the society. This is an example of the structural property of self-maintenance. Some of the old elements like the bridges were even reinforced.

Chahar Bagh and Nagsh-e-Jahan still form the powerful city spine connecting major functions to the bazaar, Chahar Bagh, as the city main axis was extended from both sides and terminated in huge circular urban places. From that time an imposed set of laws of composition has been active in the process of structuring the city, which cannot be considered as self-regulating structural property. New avenues changed the form of the old maidan (Maidan-e-Kohneh) and a new circle replaced it. As the Isfahan Action Plan (1992) explains, nowadays the old maidan is in the heart of the city centre and one of its most populated areas. This maidan has lost its beauty of Seljuk period.

The transformed structure of the city in modern era is as an irregular gridiron composed of several avenues. Within this network the two main cross axes of the river and Chahar Bagh are remarkable spatial forces. Chahar Bagh Boulevard, with its massive physical dimensions of 6 km long and 45 metres wide, is now the main artery of the city running from the south outskirts of the city to its north part.

### **7-3-3 Social Forces**

Despite trading and other kinds of exchange, Jay and Yahudieh, the two cores of Isfahan in the beginning phase of the city life could not join each other because of their cultural and religious differences and social stratification. After the arrival of Islam, the disappearance of the social hierarchy system, the opening up of new routes of communication and trade growth, the structural property of homeostasis brought a new role for the area between these two poles. That public place was not only a market but responded to new social structure of those small societies. Until the 10<sup>th</sup> century the

place had still its reputation because Isfahani people used to gather in that market place, which was called Maidan-Al-Sugh for their New Year ceremonies

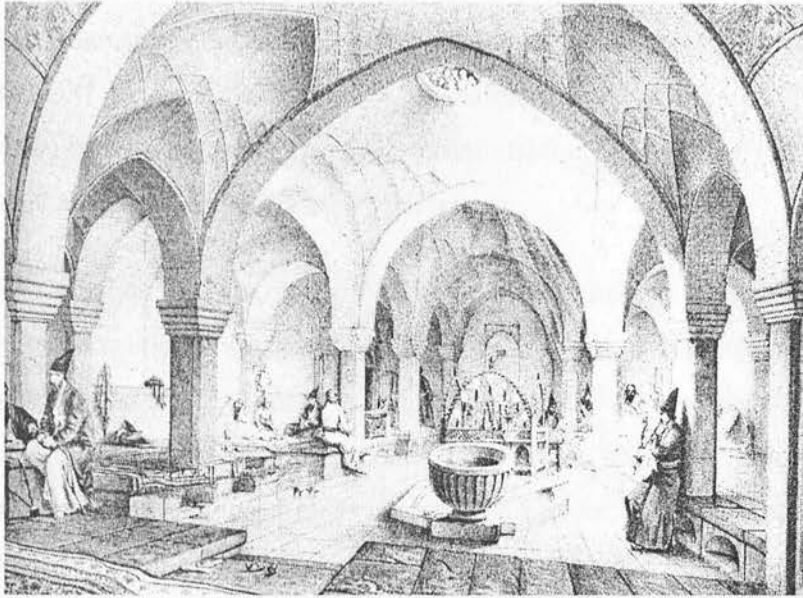
The first Friday Mosque was a response to the need for a main gathering place for all social classes to reinforce social integration on the basis of the new religion. It played an important role in the total social life of people, not only functioning as a house of pray. This place was a visible manifestation of deep structural transformation propelled by socio-cultural forces and a result of the structural property of self-regulation.

The location for many social activities beside mosques was the bazaar. It was a structural transformation of a primitive market place to more complicated social urban element. From then bazaar has always been a structural element in the city. It played a social role as the trade route, and thus the centre of social information exchange among all people, both from inside and outside the city. The bazaar and the bazaaries (people who work in a bazaar) were always influential on politics by forming people's movements, oppositions, rejections or confirmations of a ruler's policies. The bazaar itself accommodated the place for guild activities. The close relation of bazaar with other urban elements such as schools and mosques - within the texture of bazaar and adjacent to it - confirms the strong social role of the bazaar in the city. In the Safavid era, on the north part of the bazaar a hospital was constructed and there was caravanserai, which covered hospital expenditure.

The main squares or maidans were another important physical manifestation of the social demands of people. They offered appropriate places for gathering for formal and informal ceremonies and for entertainment. Political events and social gatherings, such as for elections and executions, major celebrations and rituals, had a common public palace for enactment: the maidan or the city square.

Gaube (1978) indicates that Maidan-e-Kohne was a major urban element in Isfahan in the middle ages. Schools, mosques, the palace, the bazaar surrounded this square. Most of these buildings were active in the social life of the city until the 17<sup>th</sup> century. He adds that the first two kings of Safavid dynasty paid attention to revitalising the old maidan to remain the centre of political, social and religious structure of the country. They repaired the previous urban complexes and added some new buildings. At least five buildings like schools and caravanserais were built at the north part of the maidan.

Alongside the main road, branching off the maidan towards the south-east, they built two mosques, a local bath and a school (figure 7-14). In the south-east Ali Mosque was built. Several urban complexes like Madreseh Kasehgran (the Mosques' theological school), come to be situated close to this maidan, those increasing its role in the city life. This phase could be considered as structural self-maintaining in the process of the city transformation in responding to social forces.



**Figure 7-14**

Bath of Khosrau Agha in 1851, one of the many public baths in Isfahan, which used to be a place for socialising.

**Source:**

W. Blunt, *Isfahan pearl of Persia*, 1966

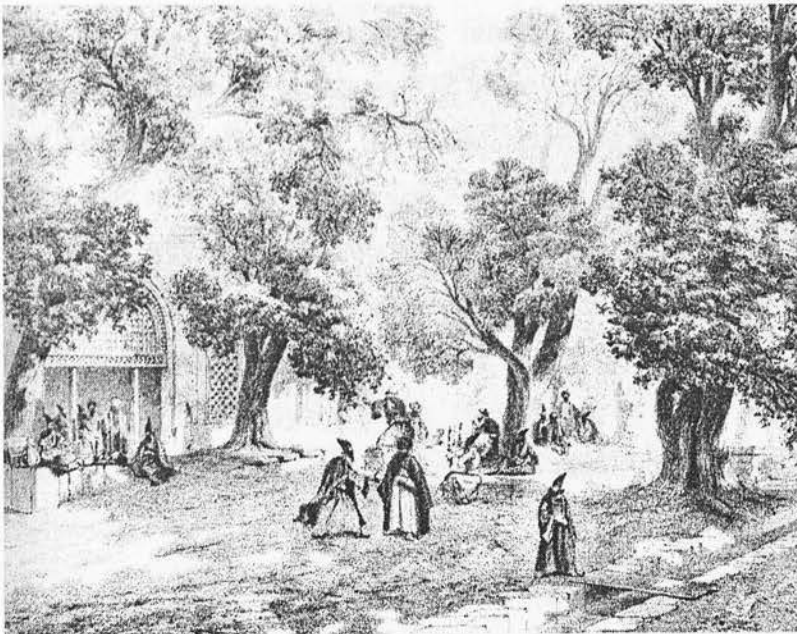
Photo: British Museum, London

The vast open space of Maidan-e-Kohneh was also an entertainment place and used to be a place for horse riding and polo in the Seljuk dynasty (Gaube, 1978). In other words it shared between governmental and religious ceremonial gatherings. It could maintain its structural function within the city by accepting various public activities. The place was appropriate for a market, because the horse riding and polo events happened only occasionally. Maidan-e-Kohneh, like squares in other Iranian cities, was the place of celebrations, prosecutions, army training and also a sports arena. These functions remained the same to the 16<sup>th</sup> century, when the new maidan - Nagsh-e-Jahan - was erected and became the city centre.

Nagsh-e-Jahan was a common open space situated between different governmental, religious, and commercial urban activities. Each activity had its own domain in the maidan. Army parades took place in the maidan. Above all formal activities and ceremonies, the maidan was a place for informal gathering as well. It was market place and also a place for people to gather and socialise. In these maidan storytellers, jugglers,

acrobats and wrestles staged displays in the nights. Shah Abbas and his family watched polo games here. In the lower galleries of the arcades that surrounded the maidan, and near the entrance to the bazaar, were the coffee-houses, which by seven o'clock in the morning were already filled with coffee-drinkers and tobacco-smokers. Adjoining the coffee-houses were several taverns, selling wine. For those who merely sought food, rather than wine or other reprehensible pleasures, there were respectable restaurants. There were also tea-houses, whose clients played chess or other kinds of games. Even the Shah and his boon companions would come to the maidan for entertainment and himself played polo there. For all different festivals like the New Year or Norouz, the maidan was naturally the focal point (Blunt, 1966). The role of the square, however, was always overshadowed by the bazaar.

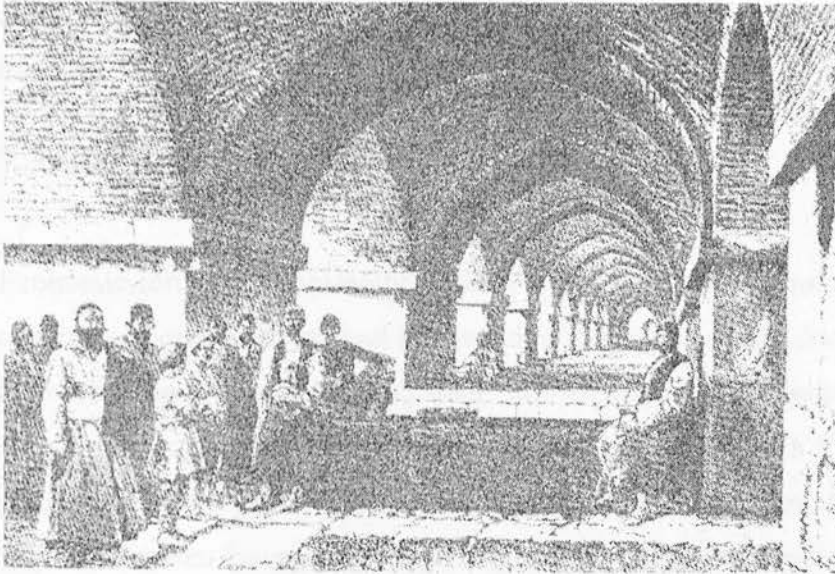
The Chahar Bagh axis, the bridges and the riverbank were offered the opportunity for a new recreational function to the city. The 48m wide street, started from a two-story pavilion in the royal area called *Jahan Nema* Palace connected by corridors of gardens and the pavilions of nobles to the *Hezar Jirib* (Royal Gardens), built on the two sides of Chahar Bagh and around Zayandeh-Rood River. Some of these nobleman's houses later became coffee houses for the public but in these days Chahar Bagh was more a promenade and garden than a thoroughfare as well as a ceremonial axis. It was landscaped with different kinds of trees and a stone-lined stream with a few springs, a suitable place for recreational activities. On its either side there was the promenade along which that people went to ride or walk (figure 7-15).



**Figure 7-15:**  
Chahar Bagh as it appeared  
in 1851  
**Source:**  
W. Blunt, *Isfahan pearl of  
Persia*, 1966  
Photo: British Museum,  
London



Like Chahar Bagh, the Khaju Bridge has always been the evening resort of the citizens of Isfahan. People took the air by the riverside, near the waterfall, and in the fine promenade that runs along the arches of the bridge. Some would go on horseback, some on foot, some would smoke and drink coffee under the bridge in the spaces provided between the arches (figure 7-16). Blunt (1966) refers also to the water festival, held on the banks of the Zayandeh-rood River, near the Thirty-three Arch Bridge. In this festival, held in the early summer, the Shah always was present, accompanied by several ambassadors. The festival was a water-fight for fun, by the water edge.



**Figure 7-16:**  
Lower Gallery of the  
Khaju Bridge in 1887  
**Source:**  
W. Blunt, *Isfahan pearl  
of Persia*, 1966

The existing centrality of the city in its region had found its compatible physical manifestation on the ground. The needs of the administrative and socio-cultural establishment and its symbolic function as the centre of regional services thus transformed the city structure. The socio-economic evolution of the city crystallised on its surface structure and the urban activities in main nodal points and its unique continues spine line or the major urban axis. Nowadays, the urban elements responding to social services, *i.e.* the recreational facilities, and hotels have mostly settled alongside Chahar Bagh and main central avenues as well as the riverbank axis with its linear park. This new spatial organisation is a result of transformation of the deep structure following the underlying forces. New forms of social relationships and demands for modern civic services also weakened the importance of the bazaar and the mosques in the social life of the city.



The natural axis of the Zayandeh-Rood River, and the linear park alongside it now provides the most important axis for social relationships and entertainment within the city structure (Isfahan Action Plan, Nagsh-e-Jahan Pars consulting Engineers, 1992).

In summary three basic places - mosques, bazaars and maidans - could be considered as places for social activities of people, although all of these places were established as multi-functional public places, providing places that accommodating many underlying social forces in the process of structural self-maintenance replied the social needs of the community. Transformation in the deep structure of the city also governed new laws of composition regarding the surface structure, manifestation of the social demands, and of the city.

### 7.3.4 Economic Forces

Economic forces are constantly influential in the transformation process of a city. The original settlements of Isfahan (Yahudieh and Jay) were both driven by the economy in their structural transformation, trade dominating their economic forces. The early structural transformation in Isfahan occurred when Jay and Yahudieh, as two rural poles, needed routes for exchange of their products. The routes and trade growth caused the area between these two poles to acquire its public, commercial function as a market. Gaube (1978) explains that there was a market place around the northern gate named Khur. Subsequently, with the emergence of the little town of Khuzainan, the maidan or the marketplace, which was on the margin of the settlement, changed to be the centre of the growing town.

An important factor in developing the city was its location in national trading routes between important cities like Ray, Hamadan and Shiraz. In the next centuries, the location of the city in the most important international trade routes connected it to Damascus and Halab in the west and Samarghand and Bokhara in the east (Nagsh-e-Jahan Pars Consultant Engineers, 1980) (figure 7-17).

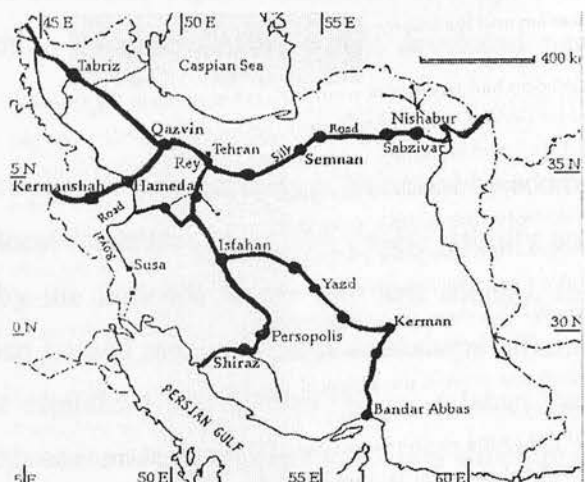


Figure 7-17: Position of Isfahan on the ancient trade routes

The settlement's location on the routes, as well as the internal needs for exchanging products, forced the town to designate an area to commercial activities at the most appropriate place, which was around the gate next to the main route. This might be considered as the beginning of structural formation, based on self-maintaining structural property. This market place later transformed into a bazaar, complete with caravanserais. In fact, the formation and transformation of two very important structural elements - bazaar and caravanserai - in Isfahan as in many other Iranian traditional cities, have their roots in the strong ties between the cities and outside/inside commerce as an determining economic force. These elements gradually transformed to greater complexity, developing from pure economic elements to important building complexes expressing their prominent social, spatial and functional role in the traditional city. As Gaube (1978) indicates, the bazaars were effective in determining different parts of the city structure.

From the Isfahan Action Plan studies (1992) some important aspects of the mechanism of economic forces could be concluded. As soon as Isfahan was chosen to be the capital by Seljuk it became the centre of even greater economic activities and developed quickly as it absorbed wealth from all over the country. Particular eastern feudalism strengthened. The economy at this time was based on soil and water, and so the production process changed. Feudal lords resided in the city to be close to government and ensured more control on their domains. This was made possible by constructing an efficient road network leading to the city centre. This led the city to adopt a structural transformation, a designed nodal point as the centre of government not only from political point of view but also from the economic aspect established to support the power of the governors. It was interaction of these forces, which developed new structural laws of composition.

In the period of next dynasty (Safavid) the economic impacts were increased by adding the national and international trades to local feudalism. After the peace, stability and flourishing international trade brought by the Safavids to the city and country, the bazaar had developed dramatically. It then housed many different workshops offering delicate artworks, so the first nucleus of capitalism was formed (Nagsh-e-Jahan Pars consultant Engineers, 1992). Regarding this economic development, the city structure at this period self-regulated towards becoming a politically and economically powerful city.

In the Seljuk era the central area, Maidan-e-Kohneh, had the adjoining linear bazaars and also the main routes towards the city gates. According to Gaube (1978), after 1600 the road, that ran from the west gate towards the north-east, became a main part of the bazaar and another road coming from the south road, connected it. The remainder of the bazaar on the north-east corner of the Maidan-e-Kohneh could be recognised from aerial pictures taken in 1924. As the residential quarters grew, the bazaar, the vital backbone of the city structure, evolved organically stretching from the north to the south gate (figure 7-18).



**Figure 7-18**

**source:** M. Ali Asgari

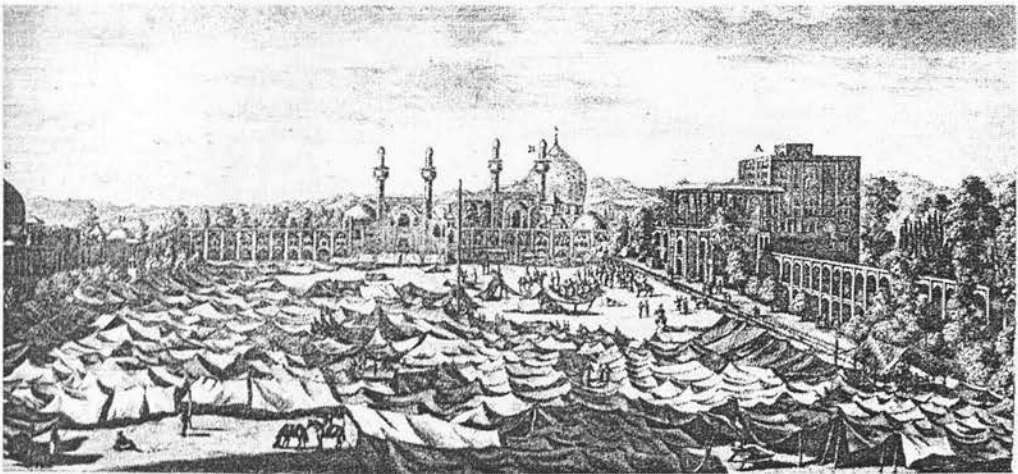
A bird view of bazaar in the urban texture, passing beside the Friday Mosque on the far back of the picture, Menar Ali (minaret) is in the foreground

Gaube (1978) believes that Shah Abbas intended to attract the most important economic activities in the city to the new centre or the Nagsh-e-Jahan in order to benefit from the shops and caravanserais located there.

Supporting the trade was a necessity for the economic structure of the city. It was one of the reasons to erect two important bridges on Zayandeh-Rood River followed by the Chahar Bagh main axis, to afford the important caravans easy access to the city centre and its bazaar. The Khaju Bridge, built by Shah Abbas II, is a further development of this idea, located at the intersection of the two main north-south axes of the city. This

bridge is located at the intersection of the two main north-south axes of the city, from the other side reached to the continuation of bazaar route.

When Nagsh-e-Jahan was erected and became the governmental centre of the city it attracted a large amount of trade particularly of high quality merchandise. The commercial functions, give secondary importance after governmental ones were located on the northern area of the maidan and were opened to the maidan by Qaisarieh gate. Besides the vast area of bazaar, internal edges of maidan had commercial function (shops and workshops). This shops joined the cultural religious function on the south and east sides of the maidan to the governmental function on the west side. Gaube (1978) describes Nagsh-e-Jahan in the 17<sup>th</sup> century as having many tents for trades and there were frames for polo at the two sides of the square, accommodating a Friday's market for rural people. The shops to the west supplied the royal family's needs. The shops on the south side belonged to bookstores and bookbinders. Other kinds of shops and leather goods workshops were located on the south side of the square. When trade with Europe developed, a special spot was reserved for the sale of trinkets from different European cities. On occasions the ordered was given for the booths to be cleared away, so that the square could be used for polo (Blunt, 1966) (figure 7-19).



**Figure 7-19:** A view of Nagsh-e-Jahan showing the square used as a market

**Source:**

W. Blunt, *Isfahan pearl of Persia*, 1966, from travels, by Bruyn, 1737, Photo: British Museum, London

Gaube (1978) explains that the bazaar on north side of Nagsh-e-Jahan was dedicated to exclusive royal trades, which sold the finest clothes in the 17<sup>th</sup> century. The Royal Mint and, on the other side, the Royal Caravanserai was located at the entrance to the bazaar.



The main trunk of the bazaar branched off among the shops into buildings built around inner courts or caravanserais. The caravanserais were places of storage for the bazaar's shops, and they accommodated some retailing and wholesale activities and were also resting places for merchants. There were some other types of caravanserais called *Tim*, *Timcheh* or *Khan* inside the bazaar complex, which were smaller and functioned mainly as commercial offices or stores (figure 7-20). These were clustered along the length of the bazaar, but sheltered from its incessant din, seemed to belong to part of a different world. The northern bazaar in Nagsh-e-Jahan is called Qaisarieh, and at this area the new and old towns joined together.

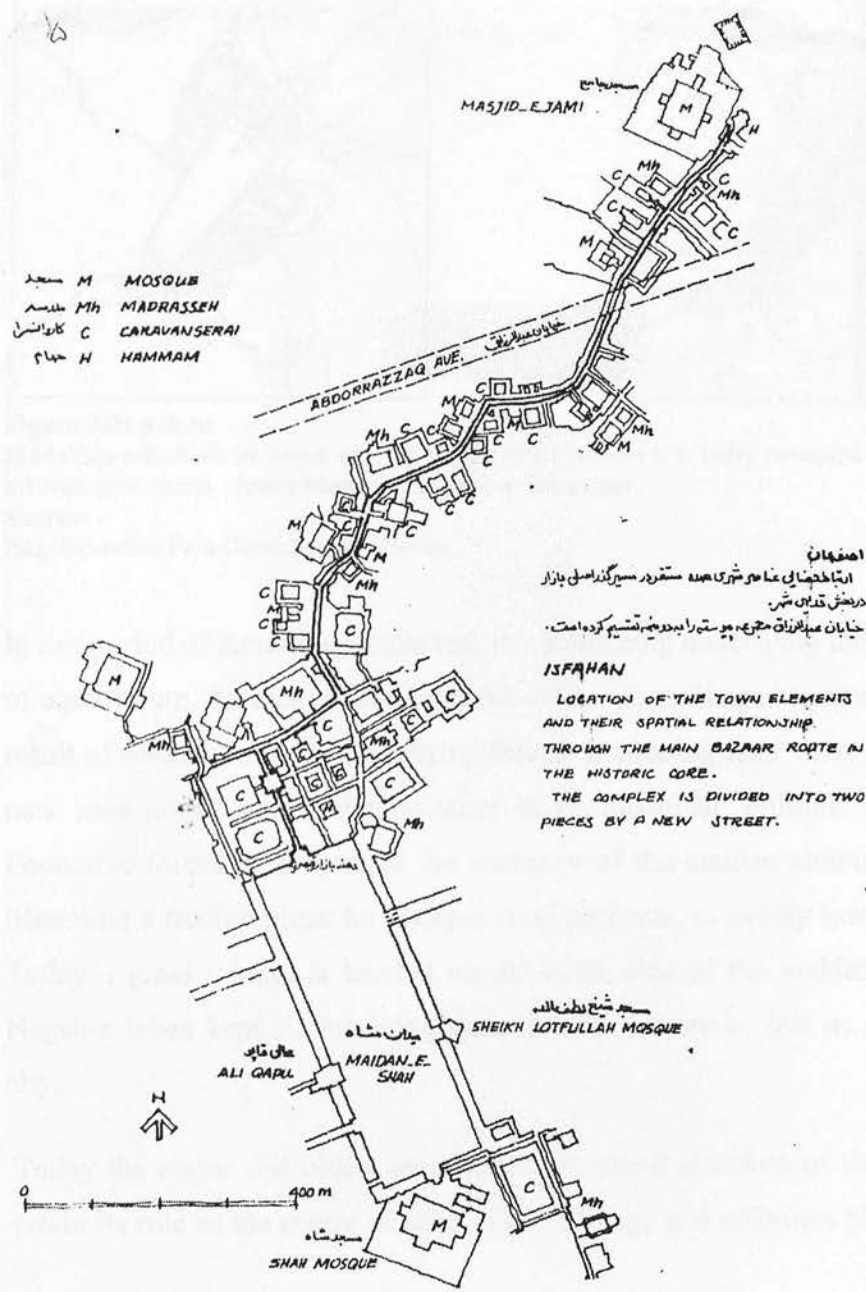
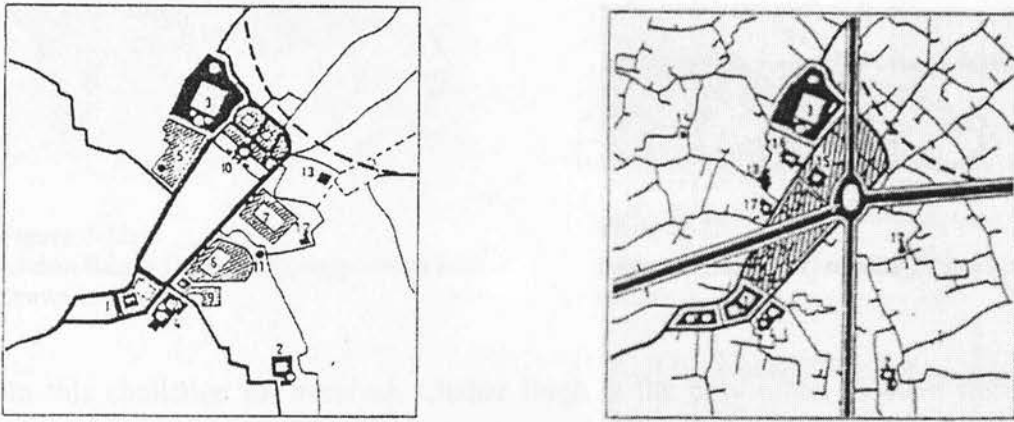


Figure 7-20:  
Main trunk of  
Isfahan's Bazaar  
and its main  
elements  
Source:  
N. Ardalan, Sense  
of Unity, 1973



The Ghadjar period, was that of recession and deterioration in the city. The most important reason was economic because most rich people emigrated to other cities like Tabriz and Teheran. The empty spaces of the old maidan were built over because the short term economic values of the maidan for the rulers had previously situated the long term historical and urban values of the place (figure 7-21 a & b). Another reason for changes in the old maidan was the change in commercial tendencies to retail and personal benefits. The old maidan was more influenced because it was closer to the bazaar. Tradesmen jobbery and personal benefiting to use the open area of the old maidan caused its high quality space and historical buildings were desolated.



**Figure 7-21 a & b:**

a) Maidan-e-Kohneh in Seljuk era b) Maidan-e-Kohneh as it is today occupied by urban texture and cut off with new streets. Jamie Mosque is in the top left corner.

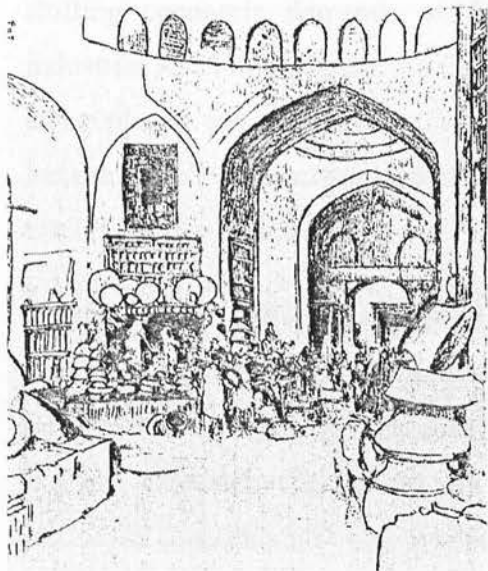
**Source:**

Nagsh-e-Jahan Pars Consultant Engineers

In this period of structural stagnation, the interacting underlying forces lost that property of equilibrium. As a physical result, the old maidan changed to small shops as a natural result of stagnation in the underlying forces. Increasing land value in the city centre for new uses added to the deterioration in its historical, political and cultural values. Economic forces thus changed the character of the maidan although it was still alive, becoming a trading place for cheaper rural products, to satisfy lower economic classes. Today a grass market is located on the north side of the maidan. In Ghadjar period Nagsh-e-Jahan kept its functional characteristics more or less as a trade centre of the city.

Today the major and oldest axis within the urban structure of the bazaar is trying to retain its role as the centre of economic exchange and activities (figures 7-22 & 7-23),

but in competition with the growing grid-iron pattern of avenues and their modern attractive and entertainment, retail institutions.



**Figure 7-22:**  
Isfahan Bazaar (Mesgarha), coppersmith section  
Drawn by Richards



**Figure 7-23**  
Isfahan Bazaar (Sarrafha), goldsmith section

In this challenge for survival, Chahar Bagh is the only urban element from the old structure of the city that has adapted to all the modern social and economic demands of the society and kept its deep structural values as well as its surface significance (figure 7-24). Chahar Bagh Boulevard has been transformed to a main locus of modern shopping centres, which offer expensive goods to people and sit side by side with official buildings.



**Figure 7-24:**  
Chahar Bagh Boulevard  
as it is today  
**Source:**  
The author

In Chahar Bagh the structural property of self-maintenance could be observed in how an urban axis, by accepting many land uses and physical changes has responded to the shifting economic demands of the society. Its transformation influenced by the industrial revolution caused nearly all the gardens and pavilions inside to be destroyed and replaced with small factories. More recently rows of shops and shopping centres have emerged to maintain the dominant functional character of this most important axis within the city main structure.

Today's tourist activities are mostly concentrated in Nagsh-e-Jahan, the bazaar, the remaining palaces, the bridges on the river and alongside the Zayandeh-Rood linear park. It could be claimed that, despite the greater diversity in urban land uses scattered in a vast street network, the old part of the city main structure, by keeping considerable part of its functions and also increasing its cultural importance, has survived and still attracts a considerable amount of urban activities.

To summarise, a composition of different urban activities with economic forces like commercial, official, entertainment and other urban services like administrative land uses, have formed alongside the main streets, particularly alongside Chahar Bagh and the area between Nagsh-e-Jahan and Chahar Bagh.

### 7-3-5 Political Forces

In the period before Islam, Jay was a centre for rulers of the whole region. The physical manifestation of this force was an *arg* or citadel located in the settlement. Defence was a considerable motivation underpinning its structural laws of composition. In ancient times in Iranian towns, the seat of government and ruler was always inside such a citadel, protected by strong fortifications. This law of composition was maintained in post-Islamic cities by the creation of the palace/citadel compound. However, this element eventually became more integrated into the city fabric. The *arg* was built as a place from which to control the city and its gates, usually close to the central cores or sometimes at the end of the bazaar. The administrative buildings grouped around it. Often the frontage of the *arg* was a large maidan that connected it to the rest of the city.

The self-regulation property of city structure from a political aspect was manifested by a combination and amalgamation of pre-Islamic and Islamic structures, which was formed

around the Jamie (Friday) Mosque and the bazaar. Political stabilisation in Isfahan after Islam decreased the importance of defence and the centre of government was rebuilt closer to the Jamie Mosque in a new place called Khuzainan.

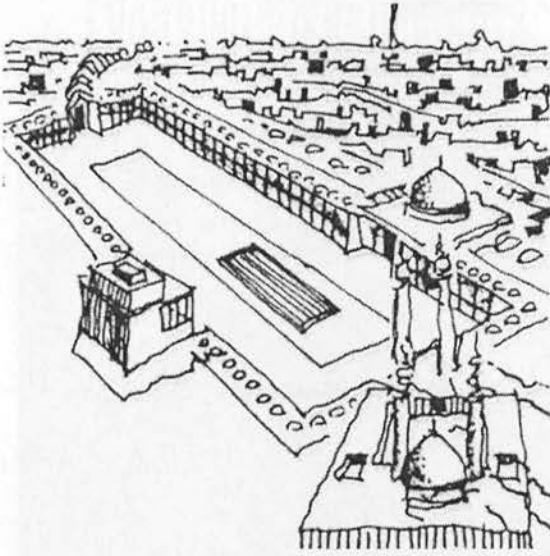
Political structure was one of the most important factors in Iranian cities structural maintenance and source of transformation. Different governments and dynasties selected different cities to be their administrative centres. Isfahan was chosen as capital in the Seljuk era and wealth from different parts of the country come into the capital and reinforced its central position. The city centre and particularly the maidan was the centre of gravity of power, governed also supported by religious and economic functions. As a consequence of laws of composition, manifested on the surface structure of the city, all the major centripetal roads ending the city gates converged at that point of power and bazaars formed along the busiest of these trade routes. The focal point of Isfahan in the Seljuk era was inherited from a previous nucleus but new structural laws of composition shaped the spatial order of the urban elements around a trapezoidal maidan, a move towards more complexity in the city structure. The powerful Seljuk rulers reinforced the maidan and its bazaar and the king built his palace and mosque on different sides of the maidan.

According to Nagsh-e-Jahan Pars Consultant Engineers (1992), after the Seljuk reign a period of misfortune and economic catastrophic came to the city and was an obstacle against continued city growth and liveability. The political power of Safavid brought back a new era of the city growth. The restoration of political centrality was a great force for the physical changes. A major step in urban structural transformation took place when Shah Abbas enhanced the power of the Safavid Empire and Isfahan was again chosen as the capital. The urban space and elements of the existing focal centre (Maidan-e-Kohneh) was found incompatible with the needs of the new political and cultural establishment and not enough to express the Shah's expansionist political programmes. Under the light of political security a new structural order and transformation came forward. Constructing the new centre for the city was a physical manifestation of political power showing off the independence from post dynasties and in the face of rising of Ottoman power.

This underlying force provided a new spatial order and new axes for the physical growth of the city. All the major urban elements like the governmental, religion,



economic, social centres were accommodated in a new maidan of Nagsh-e-Jahan (figure 7-25). So the deep structure of city self-maintained the previous laws of composition in the spatial order of places around the maidan. Its preconceived plan, imposed on the city structure, aimed to regulate the city development, extending the urban grid without radically altering its structure. Although the scale and monumentality of the new plan was unprecedented, its connection with and dependence on the old city structure, as well as its influence on it, was but a continuation of the traditional pattern.



**Figure 7-25:**

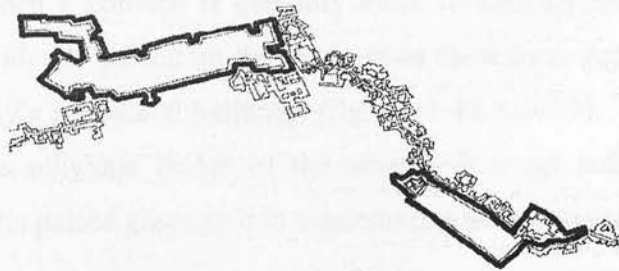
Four major functions organised around Nagsh-e-Jahan

**Source:**

M. Hamidi, Tehran city structure, volume one, 1998

Drawn by: S. Tavakoli

The new centre, built according to a preconceived master plan, was connected to the old centre through a linear network of activity along the bazaar. While sustaining the old, it therefore also attracted the centre of activities towards itself (figure 7-26). In this phase the city structure had two main nodal points and one continuous spinal line. In the new maidan, aside from its rigorous geometrical shape, one could detect the same main elements that had constituted the old maidan, but at a higher level of abstraction and offering a greater concentration of political and administrative activities.



**Figure 7-26:**

The new and old centres connected through a linear network of bazaar

**Source:**

M. Hamidi, Tehran city structure, volume one, 1998

Drawn by: S. Tavakoli



After the decision of Shah Abbas to make Isfahan his capital, in a few years it became an international capital and reached its highest point of magnificence. Many traders and ambassadors from Europe and Far East were drawn to there.

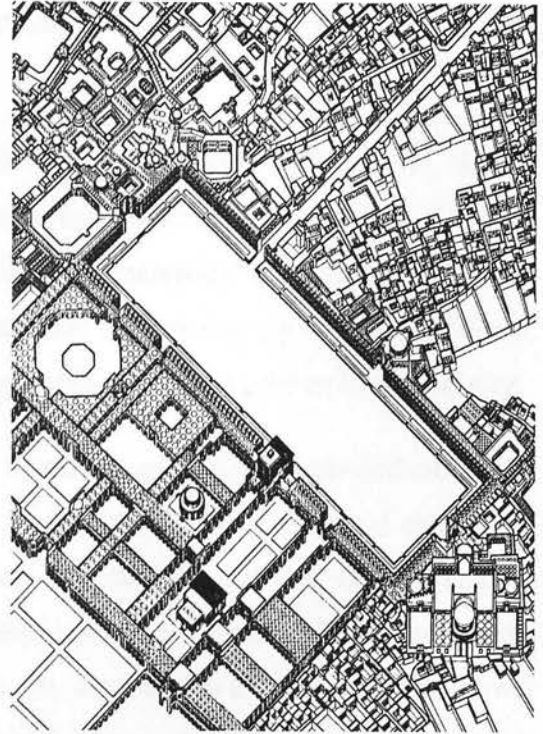
To respond new political relationships with foreign countries, the Chehel Sotoun Palace was built as a ceremonial palace (figure 7-27). Blunt (1966) explains that it was designed for state occasions and particularly for the reception of foreign ambassadors.



**Figure 7-27:**  
Chehel Sotoun Palace  
**Source:**  
M. Ali Asgari

The new arrangement of different functions around the maidan was a symbolically important sign of the deep structure of that period. The political power of the Shah was reinforced by its close relationship to the religion (Islam) that should be manifested in its physical townscape. The maidan as forecourt to the royal precinct was experienced by the citizens having business with the government through Ali Qapu (sublime port). Ali Qapu served as a palace itself. Behind this gateway stretched the palace area, which was more like a series of pavilions in a garden than the more formal European idea of a palace, although such a concept is certainly more in keeping with the classical and traditional Persian idea of palace. In the palace area there were gardens, royal kitchens, and the royal family's residential buildings (figures 7-28 & 7-29). Ali Qapu symbolised the Shah's role as religious leader of the people. It is an indigenous example of transformation of the palace gateway into a ceremonial and pleasure hideaway.

**Figure 7-28:**  
Original form of the royal districts on the west side of  
Nagsh-e-Jahan that opens up to the maidan by Ali  
Qapu  
**Source:**  
K. Herdeg,,1990, Formal structure in Islamic  
architecture of Iran and Turkistan



**Figure 7-29:**  
Ali Qapu from the back,  
showing the remaining of the  
royal distinct  
**Source:**  
M. Ali Asgari

Blunt (1966), refers to a '*glorious renaissance*' under the Safavid dynasty when it became the capital of a great empire, followed by the horrors of a the siege by the Afghans in the eighteenth century and then a lengthy decay in the nineteenth century.

In the Ghadjar period, which was contemporaneous to the industrial revolution in Europe, the city contracted. Many of its valuable buildings collapsed. The most important constructions still followed the main axis of the previous structural planning, like Khaju Bridge and Chahar Bagh Sadr and Sadr School. This avenue connects Khaju Bridge to the far end of bazaar. The design was copied from Chahar Bagh and Madar-e-

Shah Madreseh. The new maidan kept its physical characteristics more or less and stayed the main centre of the city.

Nagsh-e-Jahan Pars Consultant Engineers (1992) reveal that in Ghadjar period, Isfahan encountered political deterioration and its cultural and physical values weakened. Many of the valuable buildings were destroyed and their materials used for building new houses. Isfahan lost its nation-wide values because the capital had moved to Tehran, drawing out the political forces and stagnating the process of transformation in the city.

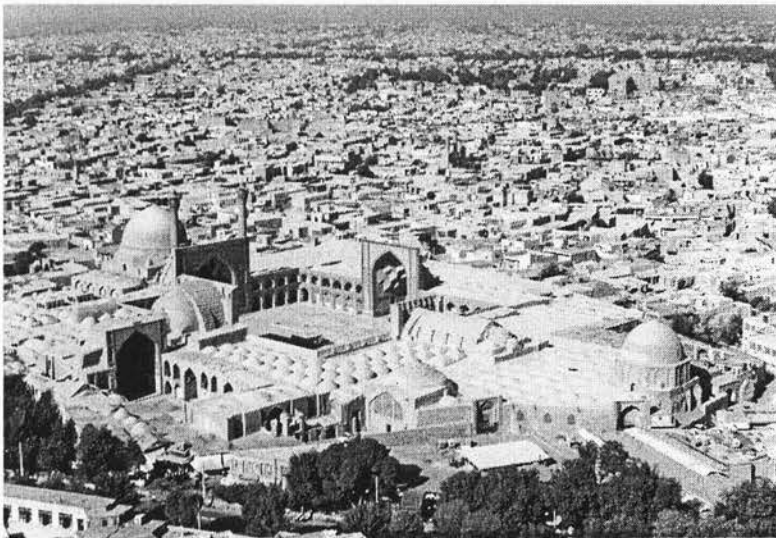
During the Pahlavi regime the political power of central government imposed modernity on the city for with the goal of its recovery and new prosperity. Physical changes in Pahlavi period saw further massive alterations to the city but this time it ignored existing structural order of the city. Reza Shah cut broad thoroughfares through the congested parts of the city, imposing upon the city structure an extrinsic political power might tore through the traditional urban fabric and some parts of the city main structure. The city structure self-maintained itself by following the new avenues of direction that were opened up and at the same time, continued its growth alongside the old axes of Chahar Bagh and Zayandeh-Rood River. In this period the old maidan and the new one still kept their place as two gravity points for the city activities but were no more the political cores of the city. The modern street network was accompanied with new official, commercial, educational and many different civic services. The laws of composition changed physical pattern of surface structure of the city from combination of central and linear pattern to a semi-gridiron pattern.

### **7-3-6 Cultural (religious) Forces**

Religion is the most important aspect of cultural forces in Isfahan's deep structure. This force is demonstrated in the surface structure of the city and its spatial organisation and also in some particular structural elements such as mosques, madrasa (theological school) and special types of urban spaces, for religious activities. Adhering to the religion was a source of influence for the rulers and a way of finding a place in people's hearts, so the most magnificent urban structural were elements erected to display their religious affiliations.

Mutations in the structural transformation of Isfahan in the first centuries after Islam came to the region subsequently caused transformations in the deep structure of the two settlements of Jay and Yahudieh. The visible manifestation of new cultural and religious basis of the society was the Jamie (Friday) Mosque which was erected in the place of Atashkadeh, the Holy Fire Temple of the Zoroastrian faith (Gaube, 1978). The consequent laws of composition were based on the centrality of the Mosque, which had a root in the cultural force. Gaube (1978) declares that Jay had a functional importance after the Arab occupation by virtue of the Friday Mosque that was erected there.

After building the Jamie Mosque in the 8<sup>th</sup> century, Maidan-e-Kohneh became the main centre of the city. Today's large architectural complex of the Jamie Mosque reflects various phases of Isfahan's long life history and the property of self-maintenance that survived this structural element through all process of structural transformation of the city (figure 7-30).



**Figure 7-30**  
Isfahan's Friday Mosque complex

**Source:**  
M. Ali Asgari

Friday Mosque was located on the north-west side of the Maidan-e-Kohneh, the old maidan. In this period the mosque according to population growth expanded and changed to be the most important social and urban activity and city landmark. On the east side of the maidan the palace was placed. These altogether made the city structure, the centre of gravity of city life (Nagsh-e-Jahan Pars consultant Engineers, 1992).

The Jamie Mosque was symbol of independent religious power with royal mosques in Isfahan or other cities in Iran. This can be traced in the existence of two religion poles in



the city structure. The Jamie Mosque is connected to the bazaar, the symbol of citizen's most active place in the city, but the royal mosque is placed within the central maidan close to other governmental urban elements.

The importance of a public place such as Nagsh-e-Jahan also resides use for religious feasts. Blunt (1966) wrote that, under Safavid, Shi'a became the official religion in Iran. For Shi'ites, the great occasion of the year is the Festival of Imam Hussein, grandson of the Prophet Muhammad. On the anniversary of the death of the Imam in a battle in Karbala, people come to the maidan for parade. This place is now also used for Friday prayers and different gatherings of the society.

Several urban complexes of different religious land uses like mosques and the theological schools were built Isfahan over the different periods of its transformation. One of the most beautiful and attractive monuments of the whole Safavid era remaining in the city structure is the Madrasa, or theological college, built on the east side of the Chahar Bagh. This is called the Chahar Bagh or Madar-e-Shah School. In the form of an urban complex, it contains a major mosque and is linked to a caravanserai, the income from which was intended to assist in the upkeep of the college. There was also a bazaar, which ran alongside the college and the caravanserai, and catered for the students. The caravanserai has now become the Shah Abbas Hotel, while the bazaar once again fulfils its original function. Madrasa Madar-e-Shah embraces the three main concepts of living, study and meditation in a beautiful, functional late Safavid architecture. This examples is one of the best samples of deep structural forces and values demonstrated on the surface structure, which may account for its survival in the city main structure, more or less with the same functions (figure 7-31)



**Figure 7-31:**  
Madar Shah complex, of theological school, bazaar, and caravanserai - changed to a hotel - and new shopping centre on the other side of the street. Chahar Bagh is axis in the foreground of the picture.

**Source:**  
M. Ali Asgari



Recently most of cultural institutions are scattered on the new street networks and the major axis of Chahar Bagh. Isfahan University is an outstanding cultural element on the far south of Chahar Bagh Boulevard that reinforces the importance of this axis.

### 7.3.7 Historical Forces

Unfortunately the city main structure of Isfahan in many periods of its life and evolution did not receive due respect for its historical sites. Many historical urban elements was completely or partly destroyed or their functions were changed. The only remarkable historical sites, to have remained, are the Safavid Royal Maidan or Nagsh-e-Jahan and its magnificent elements, and also the old bazaar, although individual complexes could be found within the city main structure. The cultural, political, economic and particularly the religious forces have provided to be stronger forces in shaping the city main structure and its transformation than the historical values (figure 7-32 a & b).



**Figure 7-32 a:**  
Nagsh-e-Jahan Square from Masjid-e-Shah

**Source:**  
Isfahan Municipality

Nowadays there is more concern for the historical forces. The historical centre of the city, which contains monuments from the Safavid era, includes an urban area and urban axis, a continuous context of variable functions, old urban complexes and buildings. These, in their contribution, make it robust in the face of many historical events and demolitions, so it is now very well known and is a world heritage site.



**Figure 7-32 b:**  
Masjed-e-Shah at night from Nagsh -e-Jahan Square

**Source**  
Isfahan Municipality

The boundaries of this historical site as described by Nagsh-e-Jahan Pars Consultant Engineers (1992) are:

*... one side reaches to the old Friday Mosque and continues to the south alongside bazaar to reach to the main square, Maidan Nagsh-e-Jahan. Then it continues from the west towards the Safavid Palace and Gardens following the Chahar Bagh main axis, crosses Zayandeh-Rood River, by Thirty-three Arch Bridge. On the other side, from Maghsud Beyk Bazaar located on the south side of the Maidan all the way through Chahar Bagh Sadr axis cross the river by the Khaju Bridge and reaches to Takht-e-Pulad complex. Concentration of urban activities within this area has always been the major factor of its importance and liveability. Today a lot of important civic service units in a linear continuous pattern established alongside these major urban axes which their dominance of some of them even go further the province.*

This entire historical site is now a focal point in the surface main structure of the city. Within this historical site, remarkable buildings are Ali Qapu or High Gate, Masjed-e-Shah, Masjed-e-Sheikh Lotfollah, bazaar, Chehel Sotoun (the Forty Columns) Palace and Hasht Behesht (the Palace of Eight Paradises) situated in the grounds of the royal

quarter, and finally the Friday Mosque. Whether these main nodal points are well-known symbols of the city is put to the test in a questionnaire late in this chapter. This prominence is also provided by the Chahar Bagh a unique urban main axis that encompasses all major urban activities. All these surface elements together give the city its identity.

The historical forces have become recently manifested in the social awareness of the values of this national heritage and strong demands for preservation have appeared in different urban planning and action plans that endorse the rehabilitation and restoration of the whole area to retain its continuity within the urban context.

### **7.3 People's perceptions of the underlying forces**

Forming a particular urban image is a mutual process of exchanging information between the observer and the urban environment. In this observation is based on the reception of different physical-spatial and also functional stimuli, although the concept forming in the mind is highly dependant on the characteristics of the individual. Achieving a shared perception of the urban structure helps people as a community to understand their city. The questionnaires used for Isfahan were designed to elicit these shared perception.

The purpose and methodology used is exactly the same as that used in Chapter Six, the Edinburgh case study. 33 questionnaires were completed by people in Isfahan. The open-ended concerned questionnaire the qualitative aspects of underlying forces. The respondents were chosen randomly but the intention was to cover a wide range of different age, social classes, occupation, and length of stay in the city. The questionnaire did not only concentrate on the built structure but also on deep structural properties by tackling underlying forces to find out the reasons behind the entity of the city main structure.

To elicit the cognitive image of the city structure and its structural elements, and to investigate the historical, cultural, social, economic and physical dimensions, a cognitive map was asked for at the end of the questionnaire. The citizens were invited to draw a sketch map to show how they understood their city has been structured.

7.4.1 The surface structural elements

As explained in part one, surface structural elements consist of buildings, streets, areas and various kinds of urban features. The first task of the questionnaire was to find out which urban elements were more important for the people. Counting the frequency of these places is the first approach of the quantitative analysis. This group of urban elements is considered as *objects* in the analysis while the reasons of their importance are considered as *aspects*.

The responses to the questionnaire reveal which urban elements have achieved deep-rooted places in collective mind of the society. The following tables and diagrams list these visible structural elements in four categories: buildings, areas, streets and features. The numbers show the frequencies in all the questions for different reasons.

The respondents' selection on the most important buildings and features in questions one and three shown on diagrams below.

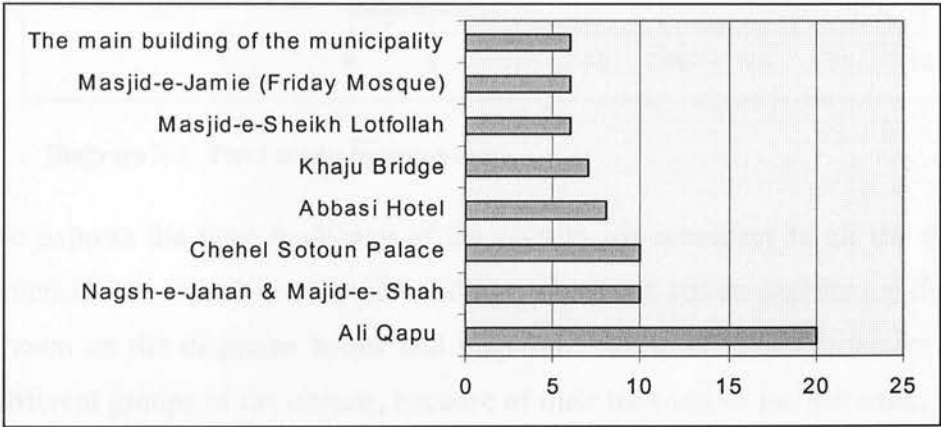


Diagram 7-1 Top 8 buildings (question one)

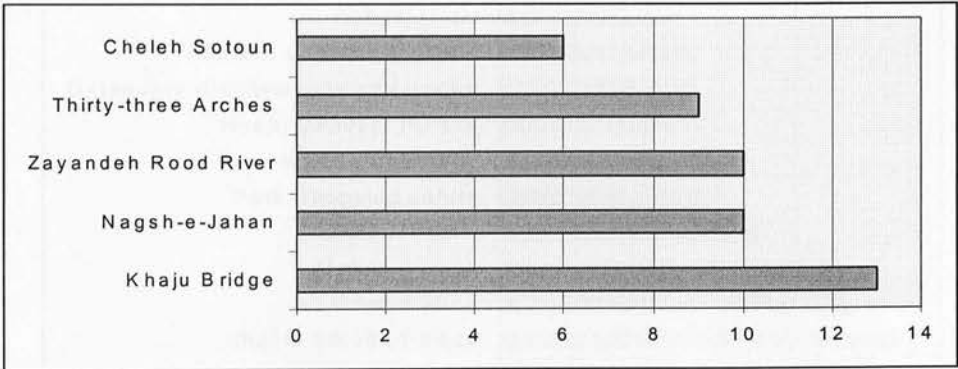


Diagram 7-2 Top 5 features (question three)

The same method is used for the streets and areas of the city as shown on the next diagrams.

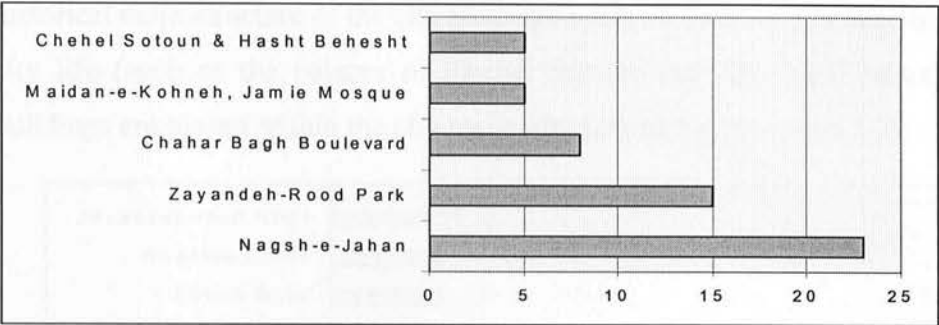


Diagram 7-3 Top 5 areas (question two)

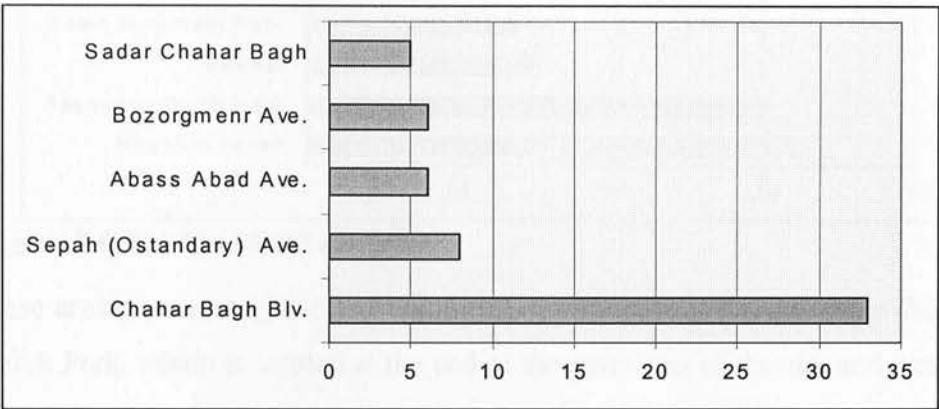


Diagram 7-4 Top 5 streets (question four)

To express the total frequency of the objects, all responses to all the questions were counted. The top 10 mentioned buildings, areas, and streets and the top five features are shown on the diagrams below and map 7-1. Some of these places are mentioned in different groups of the objects, because of their land-use or the activities, which happen there.

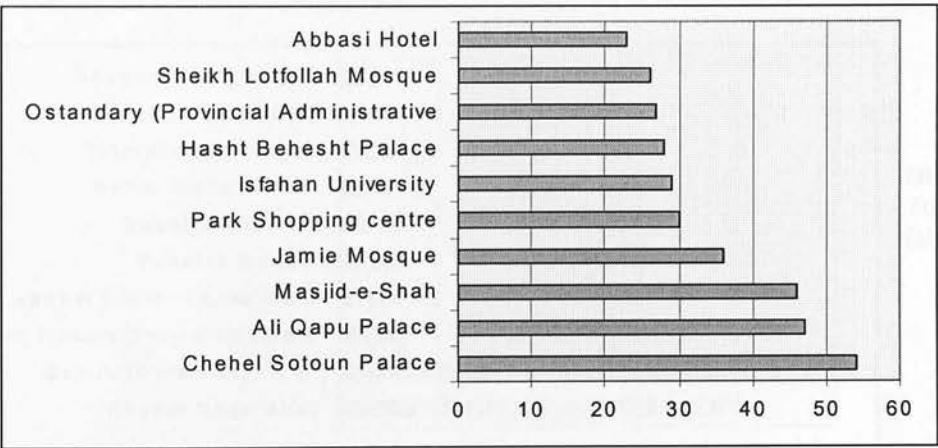


Diagram 7-5 Top buildings (all questions)



These buildings are mostly, but not all, historical buildings that cover variety of land-uses. Regarding the historical documents, even those old buildings were amongst the historical main structure of the city although some of them are not very active in today's city life (such as the palaces of Chehel Sotoun and Ali Qapu Palaces). All these buildings are placed within the city main structure of the city (map 7-2).

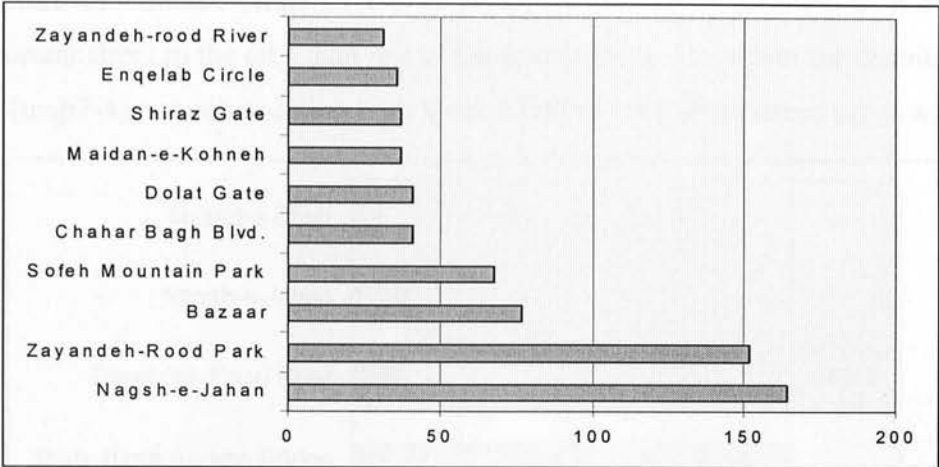


Diagram 7-6 Top 10 areas (all questions)

These areas, are mostly located within the central part of the city (map 7-3) except the Soffeh Park, which is located at the end of the main axis of the city and visible from the city centre. Azaadi and Enqelab Squares are main squares within the city street network, surrounded by a range of commercial activities. These squares are also focal points within the structural elements of streets, acting as terminals to the main commuting routes in the city. An interesting point of this table is Zayandeh-Rood and its Riverside Park. If the frequency of Zayandeh-Rood River is added to that of the Park, this natural element, which is one of the most structuring elements over in the entire history of transformation of Isfahan is mentioned 183 times, above all other areas. This confirms that people are quite aware of the role of the river in their city's structure.

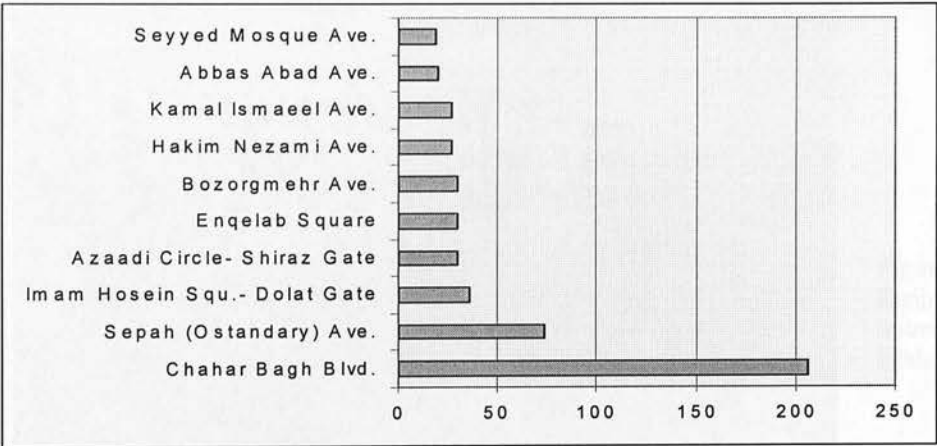


Diagram 7-6  
Top 10 Streets  
(all questions)

Diagram 7-6 shows that the most frequent street by far is Chahar Bagh Boulevard, which is mentioned in 11 questions from different angles of its importance in the city life (figure 7-24). The table shows the considerable frequency difference of this historical urban axis compared to any others on the list. This Boulevard forms the real spine of surface structure of the city, making it the real line of life within the deep structure of Isfahan. None of the respondents did forget to refer to it as the most important street in the city. The rest of the streets are all lie within the central part of the city (map7-4), accommodating high levels of movement and various urban activities.

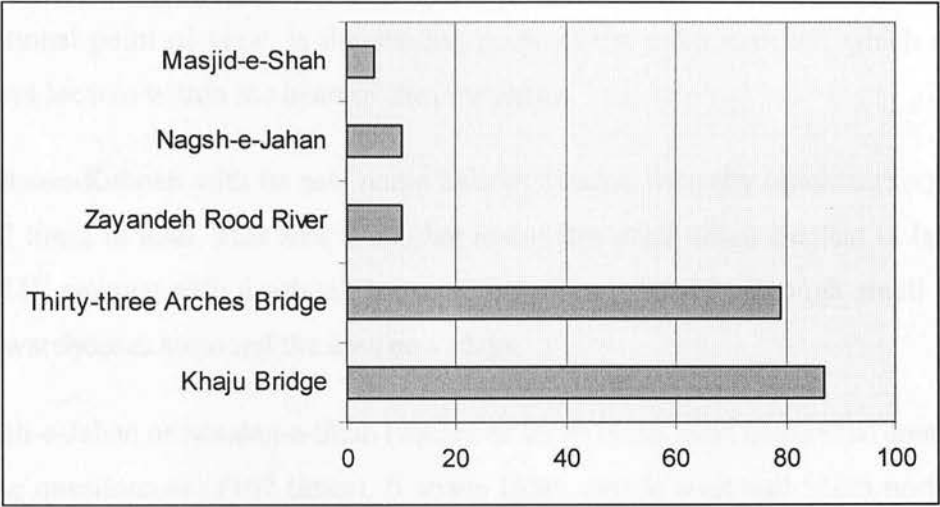


Diagram 7-7 Top 5 Features (all Questions)

The above-mentioned features were considered by the respondents, not only as urban features but also as symbols of the city and its identity (map7-4). The two unique bridges are the most mentioned features in the city (figure 7-33).

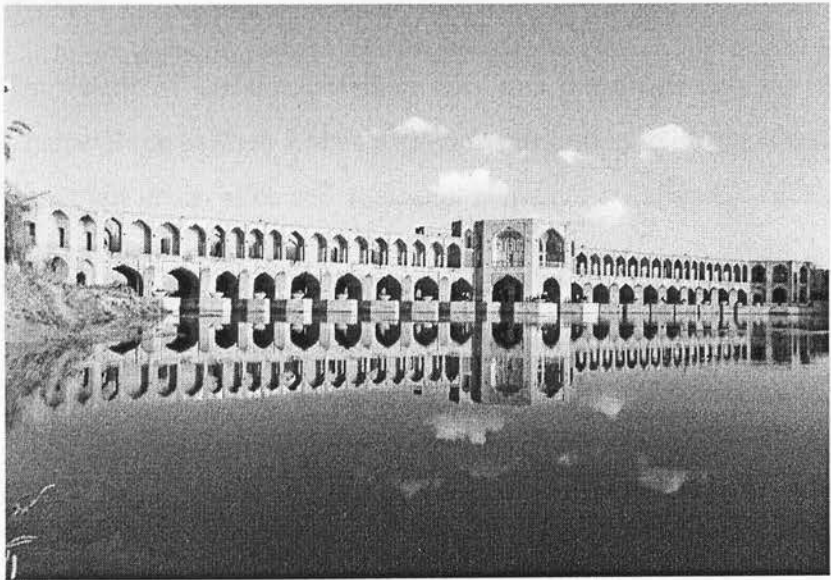


Figure 7-33:  
Khaju Bridge  
Source:  
Isfahan Municipality

The river itself is recognised as a central element of the identity of the city. The integrated area of Nagsh-e-Jahan, including its surrounding buildings and unique activities around (art and craft workshops), is a focal point for Isfahani people. These features, particularly the bridges and the river, as the responses indicate, play an important role in orientation within the city, representing an intangible and holistic value of the surface structural elements.

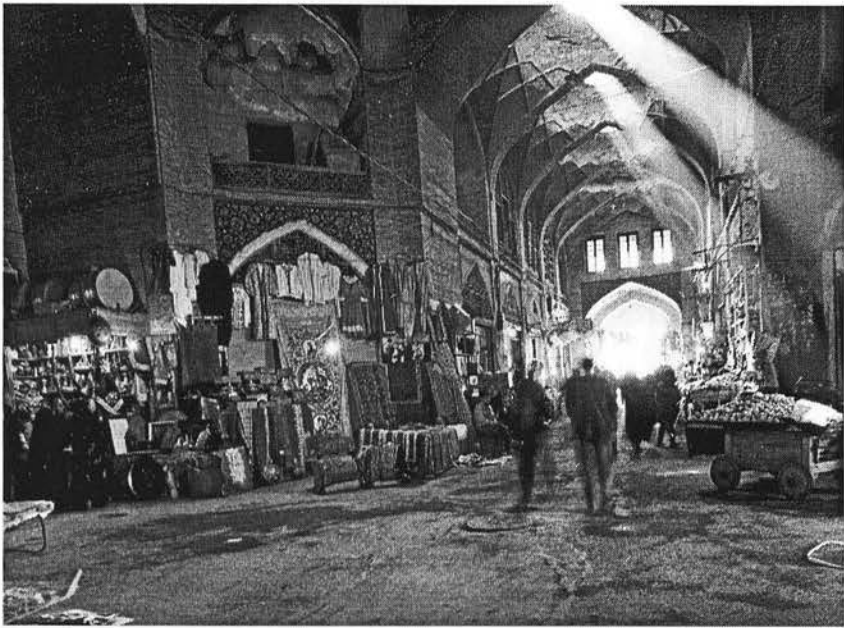
The Friday or Jamie Mosque, addressed by the respondents, 47 times in all questions of the questionnaire. This old masjid is the most valuable element from a historical and functional point of view, is the starting point of the main structure which are now as always located within the heart of the city centre.

Maidan-e-Kohne with its new name Sabzeh Maidan (literally Grassmarket) is referred to 37 times in total. This area is another major structural urban element in Isfahan from the 11<sup>th</sup> century with a school, mosque, palace and bazaar although small workshops and warehouses surround the area nowadays.

Nagsh-e-Jahan or Maidan-e-Shah (square of king) is the most mentioned area of the city in the questionnaire (167 times). It spans 165m east to west and 510m north to south. The most important urban elements of Isfahan main structure are organised around this central square, which has always been considered as the centre of the city. Ashihara (1983) claims that the size of this space is far bigger than the largest European squares described by Camillo Sitte. A two-story arcade surrounds the square. Today the first floor of the arcades is filled with shops. The bazaar links this square with the Friday Mosque.

The result of the questionnaire confirms the claim that the noble avenue known as Chahar Bagh is Shah Abbas's major contribution to his capital city. It is one of the most important urban axes and structural elements in Isfahan, and was mentioned 206 times over different questions.

The results of the questionnaire show that the bazaar is one of the most important urban areas within the city, mentioned 77 times for various reasons. Above all outstanding urban elements within the city main structure, the bazaar is the oldest and most unique structural element (figure 7-34).



**Figure 7-34:**  
Isfahan Bazaar

**Source:**  
Isfahan Municipality

The prepared map7-1, allocating all the objects that the respondents mentioned, shows the boundary of the city main structure according to the collective concept. The area it highlights achieves its role in the city life, from the combination of physical and functional characteristics, as the manifestation of various deep underlying forces. The functional characteristics of the urban elements grant them particular value in people’s minds.

Urban activities of public places are as much visible manifestation of the deep structure as are the buildings. These can be considered as bridges between the deep structure and the surface structure in a city, because they activate demands and desires of the society and express deep cultural needs. In order to learn from these, some of the questions of the questionnaire asked about the activities and land uses of the city.

The next table indicates the areas with the most important land-uses in Isfahan according to the respondents. Map 7-5 shows the central places of the most mentioned places within the city, which takes the form of a diagram of main axis and areas within the city main structure.

Land-Use	Features		Places and areas		Reasons	
Governmental Political	The province head quarter	18	Sepah Avenue	18	Centre of local government	1
	Municipality	8	Dolat gate	8	Political and governmental	2
	Disciplinary office	6	Kamal Ismaeel	6	Decision making	2
	Nagsh-e-Jahan	3	Maidan Nagsh-e-Jahan	3	Friday praying and different lecturing	
Official			Sepah avenue	20	Legal centre	8
			Chahar Bagh	12	Mostly offices	5
			Dolat Gate (square)	9	Centre of banks money exchange	6
Cultural	Head quarter of education	5	Hasht Behesht Avenue	5	Theatres and cinemas	4
	Nagsh-e-Jahan Ghadir Bagh	4	Nagsh-e-Jahan Square	4	Libraries ( Cultural centre ) Centre of art and craft	4
Religious	Masjid-e-Shah & Nagsh-e-Jahan	15	Nagsh-e-Jahan	15	Friday praying	4
	Jamie Mosque	7			Two important mosque	2
	Seyyed Mosque	6			Theological studies	1
	Madar-e-shah mosque and theological school	5				
Educational	Isfahan University	22	Chahar Bagh	22	High number of students	1
	Paradise Open University	3				
Commercial	Bazaar	20	Chahar Bagh	34	Concentration of shops	3
	Chahar Bagh	18	Nagsh-e-Jahan Square	27	Main bazaar of the city	2
	Nagsh-e-Jahan shops	10	Maidan –e-Kohne	7	Historical place	2
	Park shopping Centre	8				
	Sabzeh Maidan or -	7				
	Enqelab Square	7				
Entertainment	Zayandeh-Rood Parks	31	Alongside Zayandeh-Rood River		Location of some cinemas	
	Soffeh Park	5	End of Chahar Bagh			
	Hasht Behesht avenue	3				
Monumental	Nagsh-e-Jahan	14			Symbol of identity of the city and people	3
	Chehel Sotoun Palace	4			Tourism	3
	Jamie Mosque	3			Have several beautiful monument	3
Terminal	Soffeh Terminal	25			City centre location	
	Kavch Terminal	31			Link to the rest of the country	

Table 7-1: The most important Land-uses and the related areas



Despite changes in the form of civic activities nowadays, the major functional classification is still the same. The political function of the deep main structure has changed because it is a capital no longer but new functions such as tourism are due to become more important. According to Nagsh-e-Jahan Pars Consultant Engineers (1992), within the city main structure, more than 50% of civic services are city-wide in scale, which are mostly commercial, health care, official, educational, cultural and religious. The rest are of a district or neighbourhood service scale.

But in the eyes of people, the importance of the most activities within the city has a different arrangement (the table below).

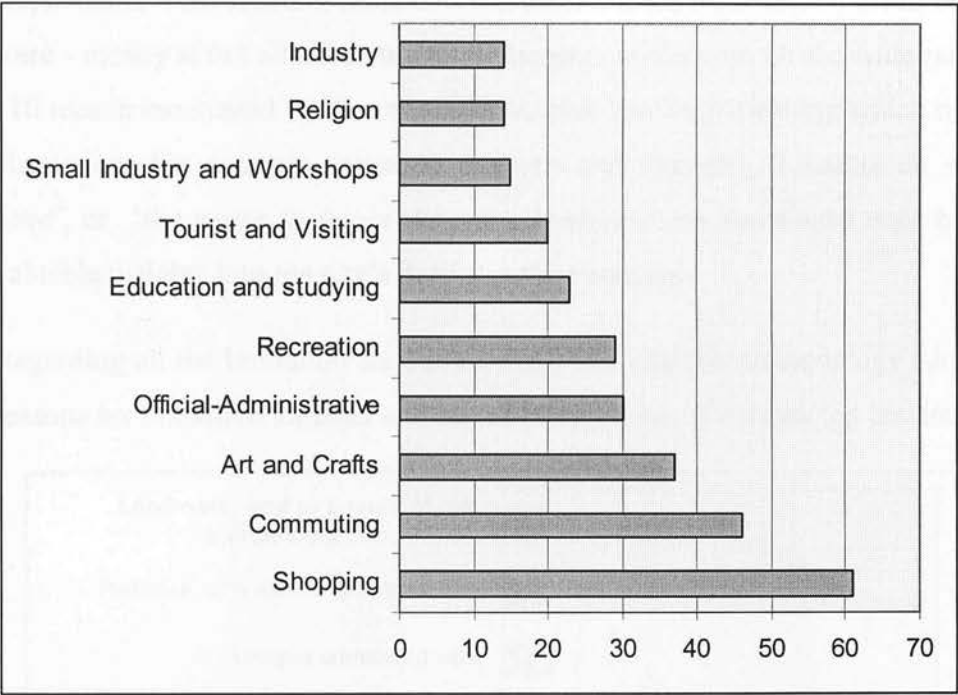


Diagram 7-8 Top 10 Activities (all questions)

The list above shows the activities that the respondents appreciated more for their role in city life. They do not perceive the quantitative ratio of the land-uses, although some similarities like commercial (shopping) remain in first place, but their qualitative significance.

In this regard, based on the variety and scale of the activities, the deep main structure of Isfahan is also a source of income and employment, providing social services, tourism and entertainment.

7.4.2 Reading underlying forces through the responses

The deep main structure in Isfahan achieves its significance and power from the underlying forces, composed from the desires and demands of the society. The deep structure has always been manifested in various city-wide functions as always from very early stages of the city life until now, and has promoted different meanings based on the whole city function and the role of the city in a vast region.

The stated reasons of importance of the urban objects for people reveals the underlying forces and consequently the dimensions of the deep structure of the city. Therefore respondents were asked to think of the aspects behind their chosen urban objects, which were - mostly if not all - the structural elements of the city. Of the wide range of nearly 110 reason mentioned by the respondents, each has deep meaning which merits its own discussion, for example ‘common concern and interest’, ‘location on a commuting road’, or ‘the major factor in the city’s liveliness’ are mentioned once but offer very valuable insights into the city’s deep structure concept.

Regarding all the limitation for this research and also the methodology adopted, similar reasons are classified together and out of forty groups of reasons top ten are:

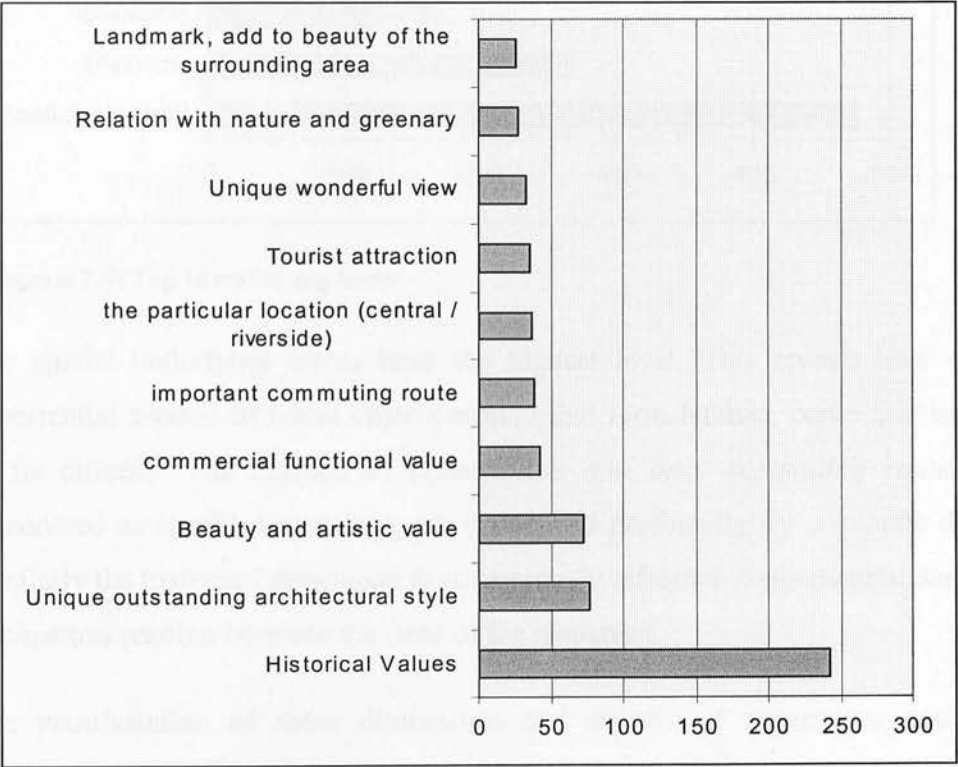


Diagram 7-8 : Top 10 Aspects (all question)

The reasons reflect values derived from underlying forces like social, spatial or economy, which are underpin the choices made by people and consequently the deep structure of the city. To trace underlying forces in the people’s cognition, the broad range of aspects, objects and activities, which were important to them, are correlated under the dimensions of the underlying forces. The dimensions concerned are: social (which covers recreational aspects); economic (which covers functional aspects); cultural; political; historical; natural-environmental; spatial (which covers, architecture, aesthetic, different physical aspects and infrastructure); and also quality of life. To give examples, *symbol of city* and *the place of theological schools* are considered as cultural, and *commercial land uses* and *centre of financial activities* are considered as economic. It should not be forgotten that all the mentioned dimensions or underlying forces work in a holistic way in the city and their interaction guide the perception of the surface structure. The resulting categorising are shown below:

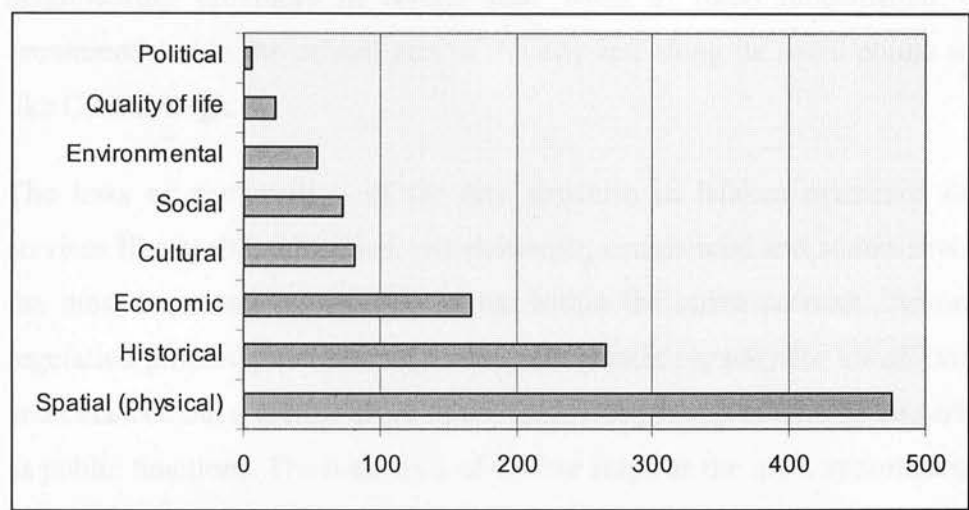


Diagram 7-9: Top 10 underlying forces

The spatial underlying forces have the highest level. This reveals how visible and experiential aspects of urban objects around that form Isfahan, come first to the minds of its citizens. The reasons of *accessibility and busy commuting routes* although considered as spatial dimensions, are influenced profoundly by economic dimensions. Similarly the historical dimension is ambiguously reflected to the cultural and economic dimensions reading between the lines of the responses.

The manifestation of these dimensions and aspects of importance could also be confirmed in the global functions respondents considered important for their city. 32 out of 33 respondents emphasised on historical aspects because of *many historical*

*buildings, antiquity of the city* and being *registered as a world heritage site*. Nearly the same number mentioned tourism as a main functional characteristic, giving *the long history of the city, historical sightseeing in the city* as reasons, as well as *the high number of tourists*. For 80% of respondents, industrial function was major function of the city because of *the high number of factories* and *the small workshops in the city*. Cultural and political functions, both with reasons heavily associated with history, followed.

The most constant global and characterising functions of the city structure are administrative or governmental, and the rest are commercial and religious, with critical economic, social, cultural and political importance. The importance of these functions is historical, because Isfahan was the capital of great emperors in at least two periods of its life, and is still the centre of industry, art and handcraft and administration for its neighbouring provinces in central Iran. Most of these fundamental functions are accommodated in the central part of the city and along its nodal points and main axes like Chahar Bagh.

The laws of composition of the city structure in Isfahan organised different civic services like health, education, entertainment, commercial and administration alongside the most important commuting routes within the street network. According to self-regulation property, commuting routes with greater capacity for transformation adapted and balanced out a greater share of the underlying forces to emerge on surface level and as public functions. The main axis of Chahar Bagh as the most important of such routes has always been the principal conduit of city growth and accordingly the structural transformation.

Chahar Bagh has continued to be the favourite haunt for the Isfahan residents during the evenings, a historical aspect of deep structure manifested in this grand boulevard. During the day it is a very busy thoroughfare.

Isfahan's deep structure is heavily influenced by Zayandeh-Rood River. The role of this river in the deep main structure has only increased through the gradual growth of the city towards it. It has adopted considerable importance in the city life because of its natural beauty, and the most delightful views in the city are from the river and the *Maddys* (tributary streams from the river) and its potential for providing facilities for

leisure time and cultural activities (Mirmiran 1988) (map 7-6). The park on the riverbank is the third most mentioned, which reveals how this unique natural object has maintained and transformed its valuable role in the city main deep structure. The aspects of importance of this place for the respondents are shown on the table 7-2.

In evoking the profound role of Zayandeh-Rood River in the city deep structure, the respondents referred to its landscaping and parks saying because *it has increased recreational facilities and places* and *it makes their city more beautiful*.

The bazaar in Isfahan is still the focus of major commercial activities, with many shops and caravansaries, but more importantly, the deep structural property of self-regulation in Isfahan preserves - to some extent - its role as the centre of social, cultural, religious, recreational and political activities at least for some social classes. Although many of the aspects of importance of the bazaar in urban life have been transformed and overshadowed by modern life style, people still refer to this place because its many role remaining important in the deep structure of the city through commercial activities and art and crafts and its historical values (table 7-2). Many mosques, madrasas (religious schools), bath houses, teahouses and other land-uses are mixed and congested there, comparable to the role and significance of plazas in European cities, that have the same quality as gathering places of urban activities. Much of these roles threaten to be taken away by modern facilities and established in new parts of the city.

Since Islam, in Isfahan, like other Iranian cities, the mosque has developed be centres of residential as local areas. The Jamie (Friday) Mosque fulfils this role for the whole city. These buildings have constantly been used for community or city. Isfahan's Friday Mosque is now both a monument and a living museum of different artistic periods and architectural styles, although the reason of importance of this structural elements in the city as people are concerned are cultural and religious, followed by the historical value and then the physical architectural characteristics.

Th deep structure of the city has self-regulated this social-religious underlying force by giving this role to Maidan-e-Shah which is not only a focal point in the surface main structure but also significant phenotype of how the deep structure of a city is reflected on its surface. This place is now used for Friday prayers and different gatherings of the society. This maidan fuses four the major urban functions of political, cultural-



religious, economic and social entertainment in one urban space. Two other aspects of deep main structure in Nagsh-e-Jahan are demonstrated on its acting as the centre of the arts and crafts and weekly markets, combining the cultural and the religious needs of the city (table 7-2).

<i>Reasons</i>	<i>Objects</i>	Chahar Bagh Blvd.	Nagsh-e-Jahan	Riverbank Park	Khaju Bridge	33 Arches Bridge	Bazaar	Sepah (Ostandary)	Soffeh Mountain Park	Chehel Sotun Palace	Ali Qapu Palace
Historical values		22	55	15	11	16	6	0	0	18	16
Architectural style		3	9	0	17	11	0	0	0	14	18
Artistic value & beauty		5	8	14	14	13	1	0	0	7	3
Functional, commercial or official value		48	50	4	1	1	44	30	0	0	0
Commuting & connecting		26	1	0	0	1	0	4	0	0	0
Location (central, riverside)		13	1	2	1	1	0	2	0	0	0
Tourist attraction		2	9	4	0	0	0	0	0	1	3
Art and crafts making & selling		8	25	0	0	0	16	0	0	0	0
Unique wonderful view		7	18	23	15	14	1	1	31	3	2
Recreation		6	2	45	0	1	0	0	6	1	0

**Table 7-2 :** Aspects of importance for all objects (buildings, streets, areas, features), mentioned in different questions.

The cultural underlying force in the deep structure of the city is very profound. Except mosques as the best symbolising and serving this force, theological colleges, completes this task. More important theological colleges are usually located close to the central core of the city, as is the elegant college Madar-e-Shah school in Chahar-Bagh. There are some other schools in the bazaar and adjacent to important mosques within the city centre and local centres. The number of these joint mosques and theological schools in the central part of the city confirms the religious and educational underlying forces within its deep structure of the city.

The high number of historical values of places mentioned by respondents indicates how such deep-rooted values remain strong in their minds. The historical underlying force is important in Isfahan, although the current society prefers modern ways of living.

For 44% of the respondents, the historical buildings and their art and architectural values comprise the source of identity of the city (map7-7). Zayandeh-Rood River and its unique bridges (43%) and arts and crafts (40%) are spoken of as other symbols of the city and its identity. The old historical centre of the city (Nagsh-e-Jahan, its buildings and bazaar) considered by 25% of responders as identical urban elements within the city. To only 12% of people was the modern industry of the region symbolic of their city. This results confirms that despite considerable changes in different dimensions of life, the deep structure of city has been able to protect and self-maintain distinctive places and factors in the people cognition.

These sources of identity are also suggested as tourist attractions. More than 75% of people, believe that tourists should visit Nagsh-e-Jahan, the buildings surrounding it, the bazaar and the palaces nearby (map 7-7). Following this, the river and its park, and bridges come second. For majority of people historical importance is valuable in attracting tourists. In this point three dimensions of historical, cultural and economic closely interact to shape the spatial manifestation of the city structure. Although these values were ignored as recently as 60 years ago, resulting in disintegrated urban fabric, as a result of homeostasis, the need for revitalising historical areas within the city has increased last few decades.

When asked about the places that should be preserved, more than 90% of responders, referred to historical buildings of Nagsh-e-Jahan, and its surrounding buildings, old historical neighbourhoods (40%) and Zayandeh-Rood, and the riverbank park and the bridges (52%), because these places are their *national glories, reminders of their history and sources of identity*.

The economic force, as a deep structural element in Isfahan, is still recognisable in the linear bazaar with its sophisticated and complex branches. This major element of the city is not important just because of its economic role but the functional importance or strategic location of Iranian bazaars, which makes it the Iranian city's central element, is based on its flexibility to combine other major elements - such as mosques, schools, teahouses and bathhouses - to create a multi-functional city complex with multi urban task which are derived from the city deep structure. Chahar Bagh is another economic spine of the city, with broad range of activities, particularly between Dolat Gate to the north and Shiraz Gate to the south.

Most social contacts, either for work or for fun, happen within the city main structure because of the broad range of the activities going on, and the related services and facilities.

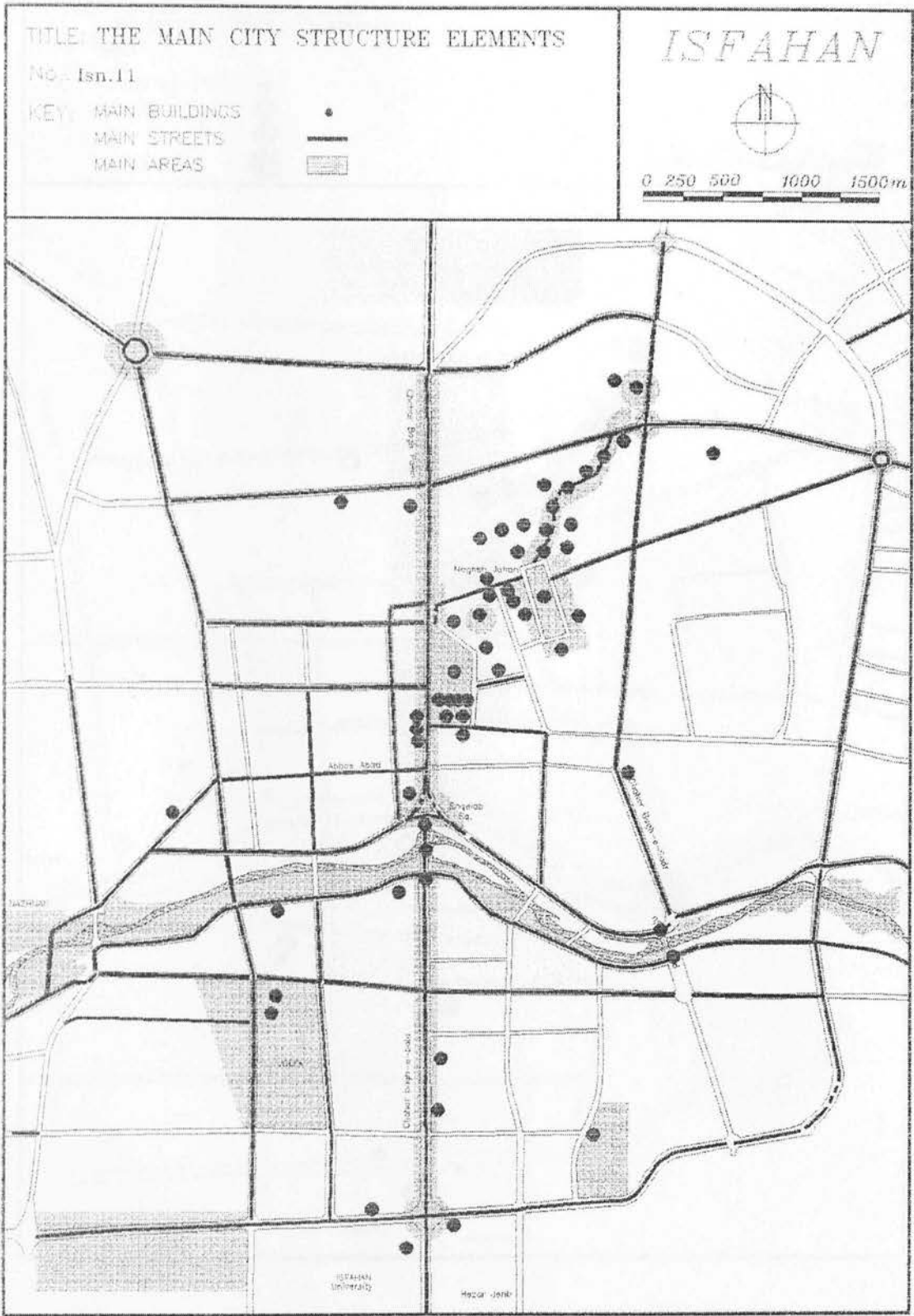
The city main squares (Maidan-e-Kohneh and Nagsh-e-Jahan) have played a pivotal role in the society from the beginning because they are, and always have been, the focal points of commerce, cultural and social activities, formal ceremonies, informal shows and other kinds of entertainment. Even today the Friday Prayers, a particular form of socio-political gathering, takes place in there (Nagsh-e-Jahan) reinforcing its civic role as a symbol of the citizens' identity.

Gaube (1978) explains that Nagsh-e-Jahan could not achieve the importance of being the only centre of the city and, in spite of the new Jamie Mosque (Masjid-e-Shah), the old Jamie or Friday Mosque has kept its importance between people and continues to attract a lot of people to the old square. The Friday Mosque, from the beginning, was central in the life of people as the main gathering place for all social classes, although this place is now overshadowed by commercial land use.

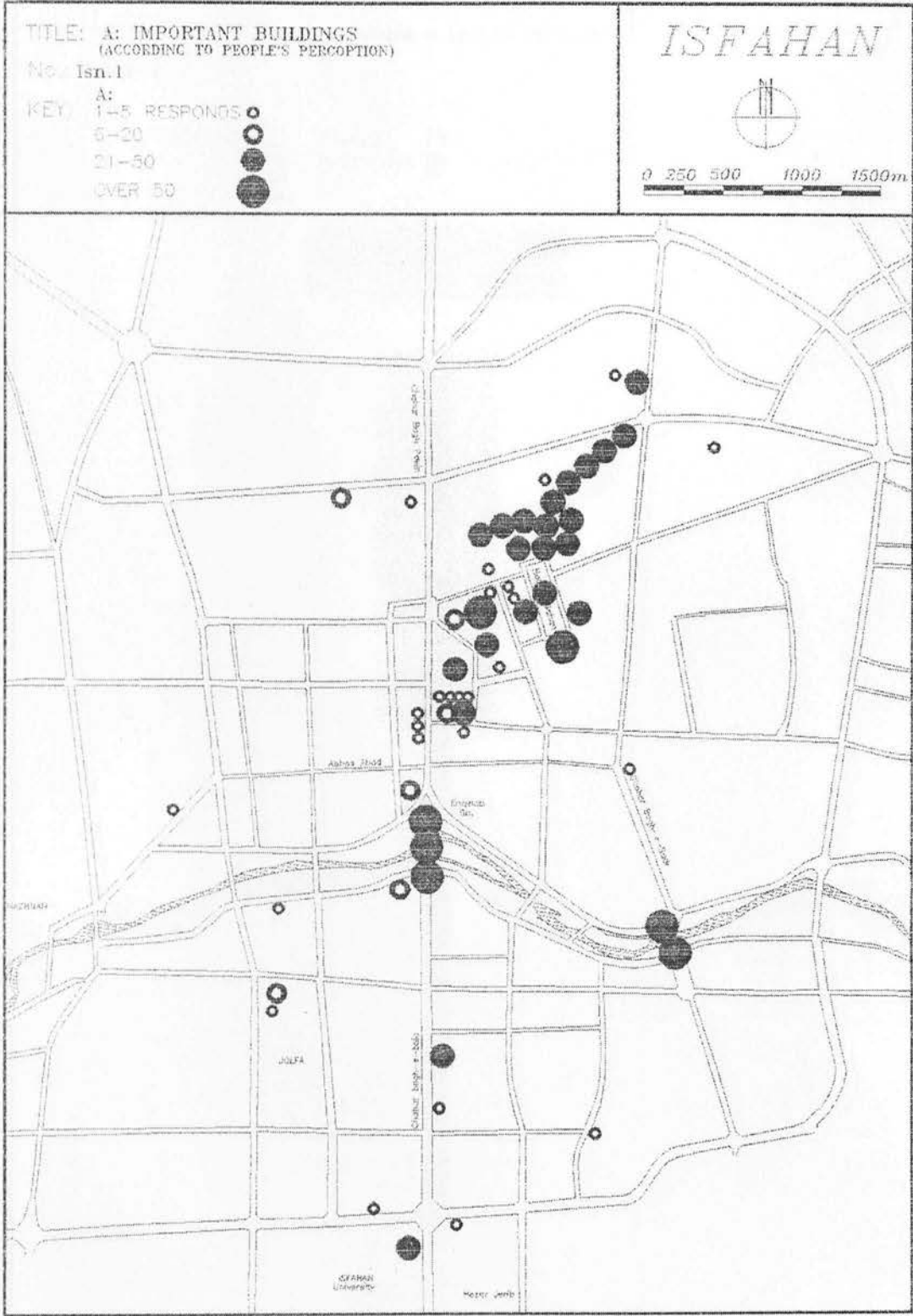
Each of these competing Jamie Mosques work like a complex institution, which serves various religious and social purposes, even as daily places for simple activities open to all the social classes. They provide a place for resting, for meeting each other and even home for homeless people.

Pope, the great expert of Iranian art and architecture writes:

*The mosque is the city; or rather the focus of the city, and its physical ambiguity represents a definite spiritual fact and purpose. It records the city's life and grown and comprises many secular and all its spiritual functions (Pope, 1965, vol.3, p. 909).*

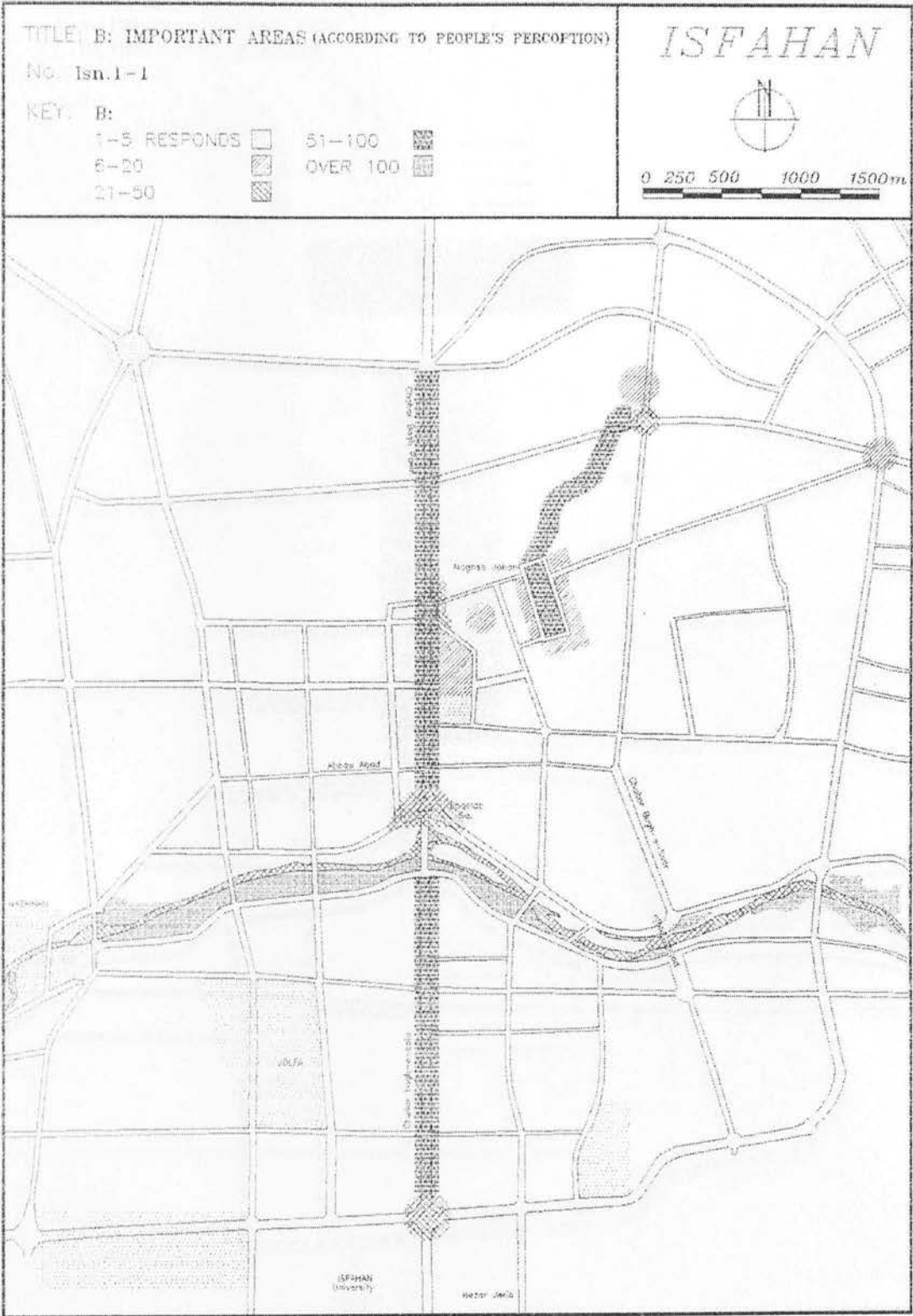


Map 7-1: The city main structure elements according to the questionnaire's respondents

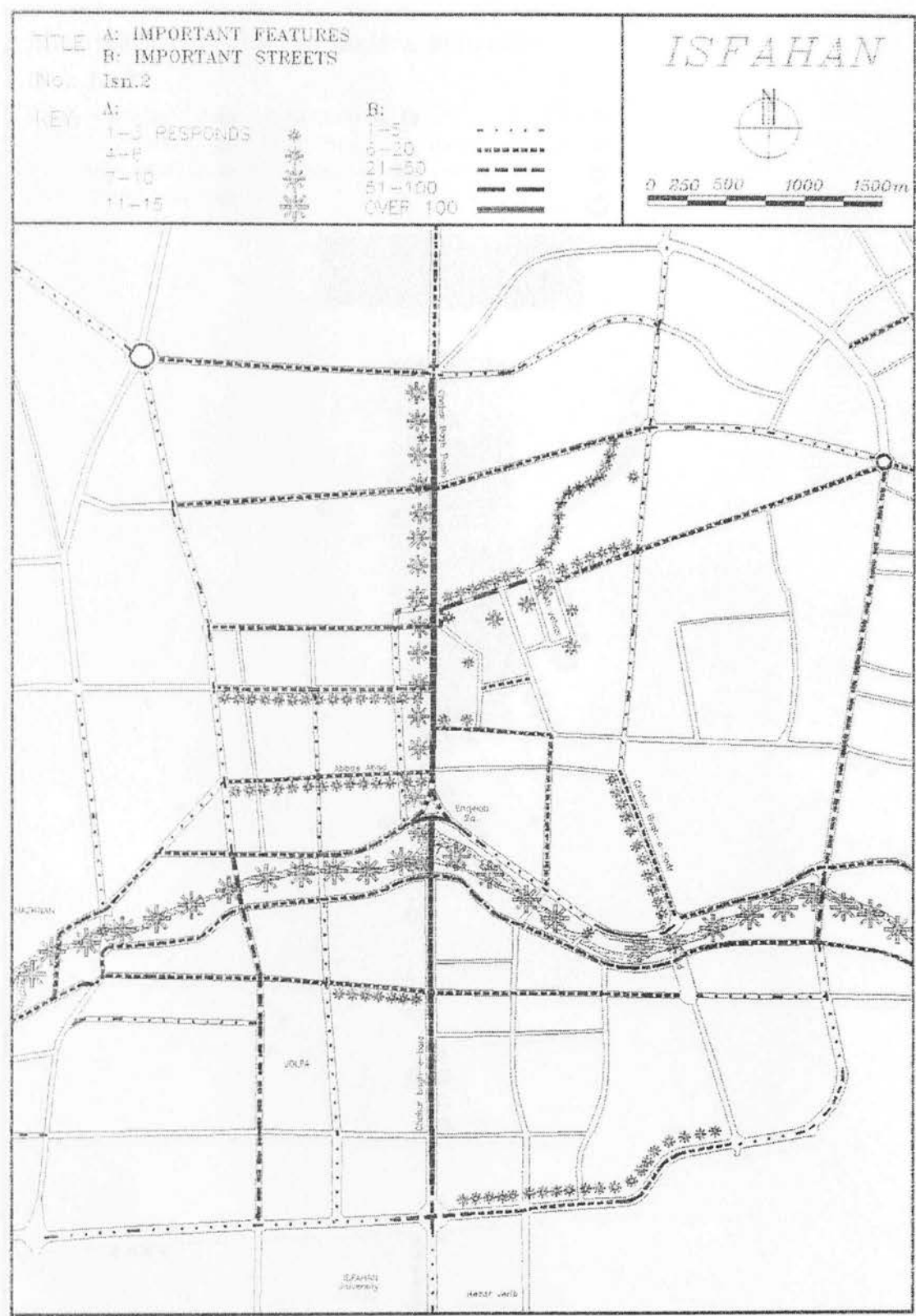


Map 7-2: Important buildings according to the questionnaire’s respondents

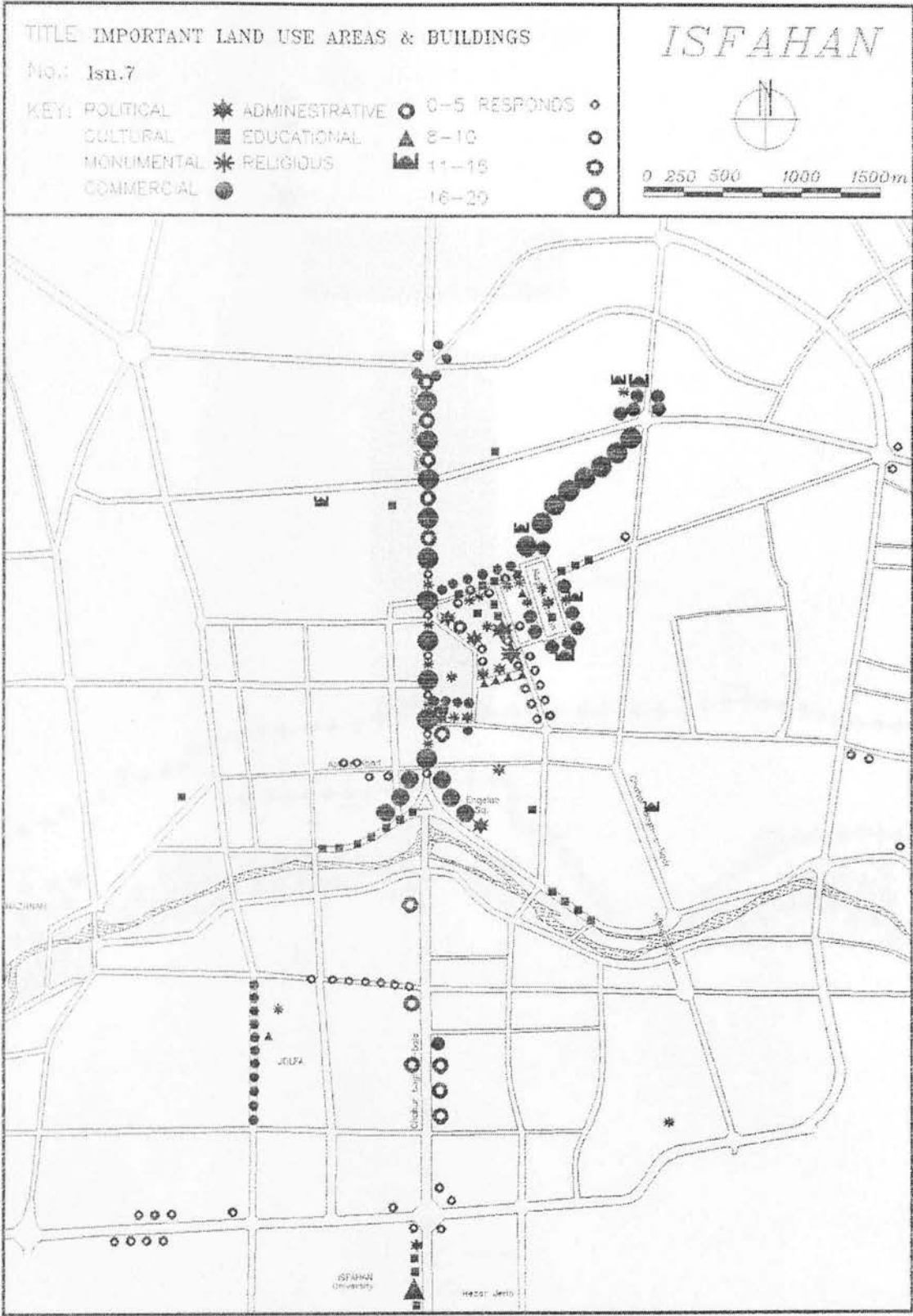




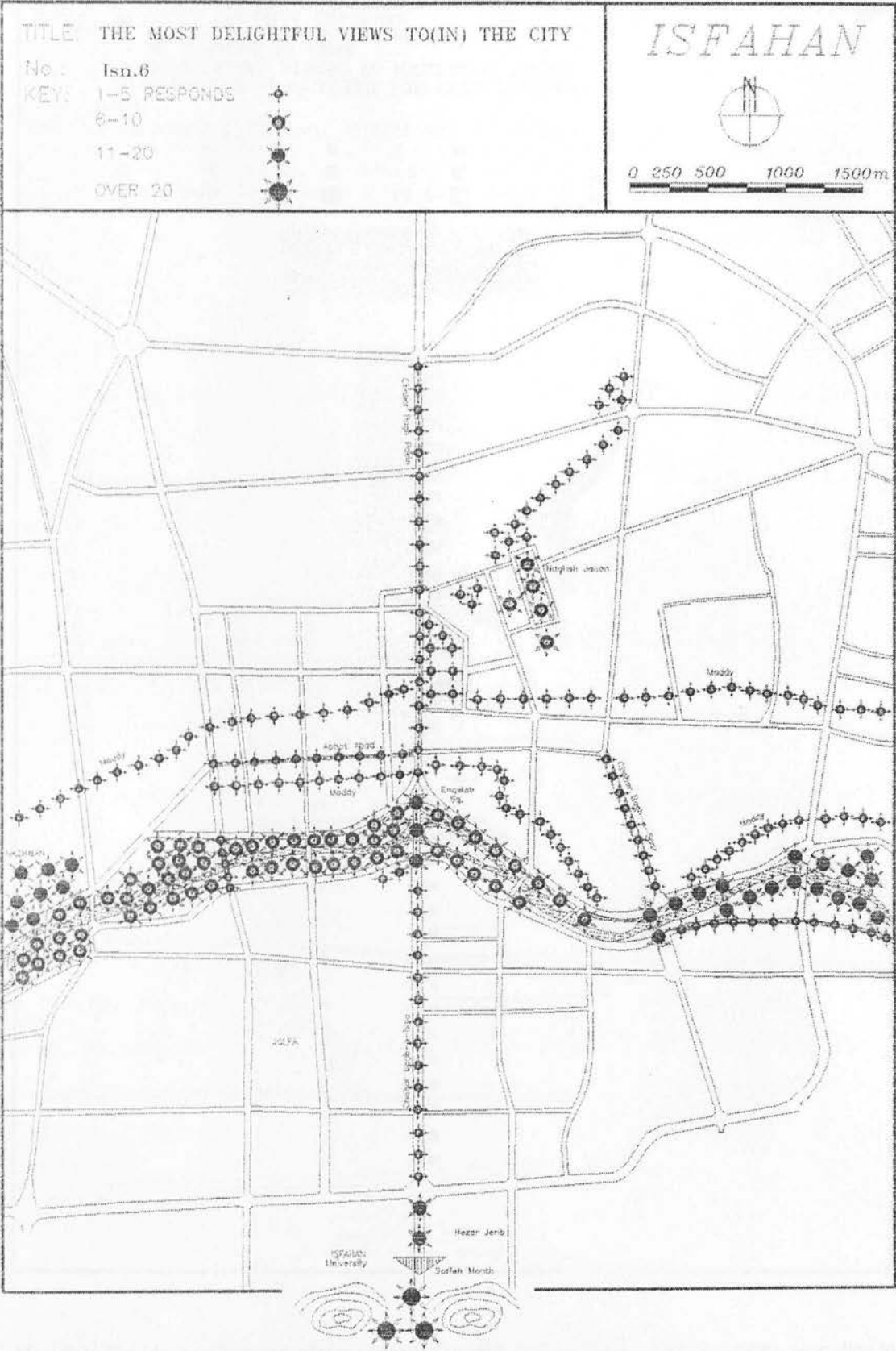
Map 7-3: Important areas according to the questionnaire’s respondents



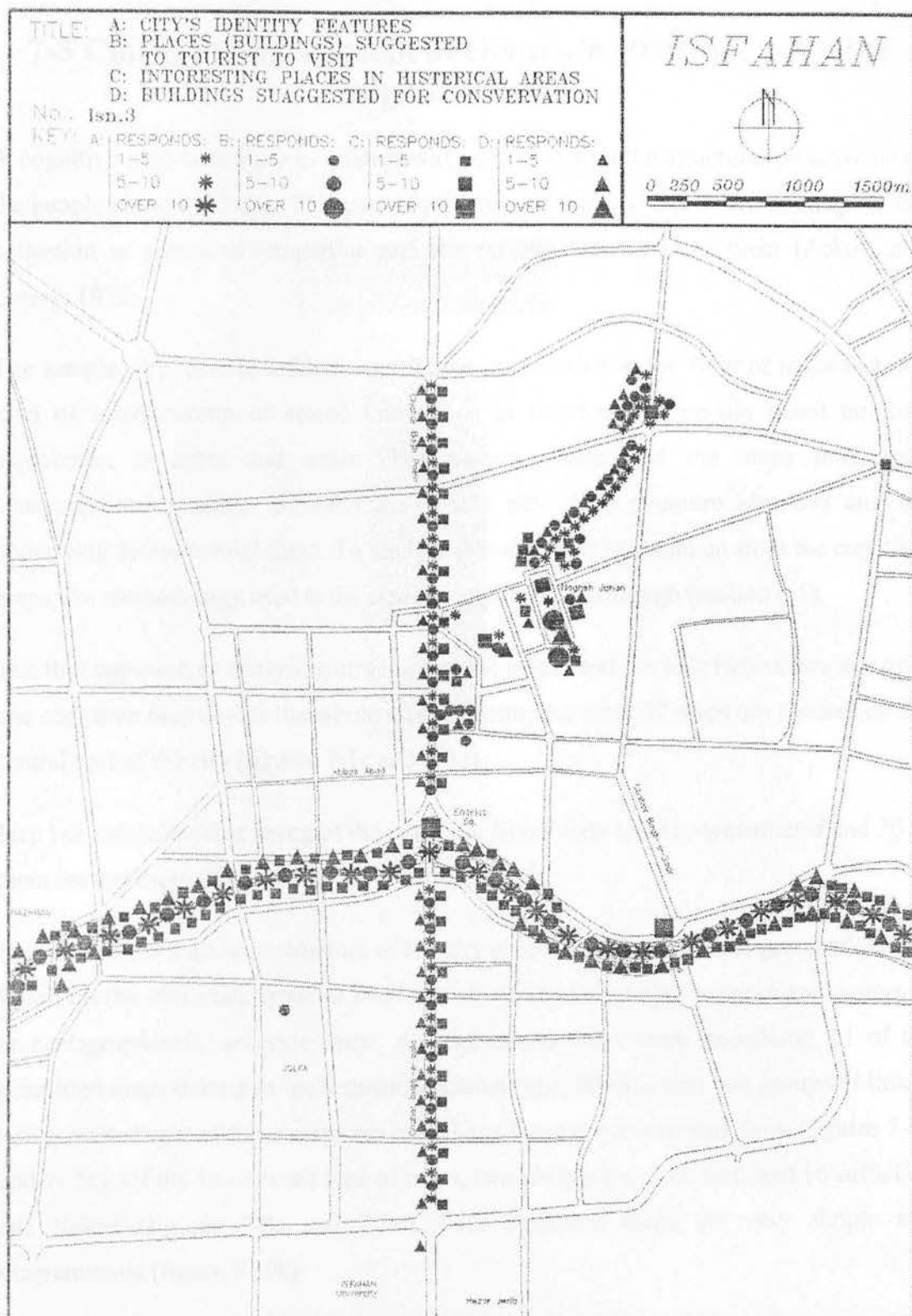
Map 7-4: Important features and streets according to the questionnaire's respondents



Map 7-5: Important Land-use areas and buildings according to the questionnaire’s respondents



Map 7-6: The most delightful views in Isfahan according to the questionnaire’s respondents



**Map 7-7:** The identical features, places suggested to visit, and for conservation in Isfahan, according to the questionnaire's respondents



## 7-5 Clarifying the concept of city main structure from the cognitive maps

A cognitive map technique in Isfahan was used to derive the structural perceptions of the people about their city. This part of research tries to find out a mental image as the collection of structural properties and the relationships between them (Ackoff and Emery, 1972).

The sample of people in Isfahan contributed information in the form of maps that is a kind of interpretation of stored knowledge in mind of the people based on their experience, thoughts and sense. The names, places and the maps form total conceptualised relations between the visible city main structure elements and the underlying forces behind them. To analyse this available information from the cognitive maps, the methodology used is the same as applied in Edinburgh (section 6.5).

The first approach in analysing structure of the maps, and the first step shows that only one cognitive map covers the whole city structure; the other 32 maps are focused on the central part of the city (figures 7-1c and 7-2c).

Step two considers that seven of the maps are *basic*, only one is *sophisticated* and 26 of them are *sufficient* (figures 7-3c, 7-4c and 7-5c).

Step three shows the way structure of the city is conceptualised by that group of people. Based on the four main types of *fragmented*, *sequential-spatial*, *network* and *patterned* or *cartographically* accurate maps, no fragmented maps were recognised. 11 of the submitted maps belong to the sequential-spatial type, divided into two groups of linked and mosaic. Eight of these maps are linked and three are in a mosaic form (figures 7-6c and 7-7c). Of the 18 network type of maps, two are basic and mosaic, and 16 sufficient and linked (figures 7-8c and 7-9c). Four cognitive maps are very simple and diagrammatic (figure 7-10c).

For all but one respondent, the concept they drew of their city was equal to the area suggested in this research as being the city main structure. The high percentage of people who expressed their city through that central area, confirms its centrality within the total city structure. Moreover, the only cognitive map showing the whole city

structure clearly indicates the two major axes, Chahar Bagh and Zayandeh-Rood River in the city structure.

The remarkable conclusion from categorising and defining the structure of the cognitive maps is how much the street network influences the cognition of the respondents as the structural organiser of the city. This very profound is revealed by the high number of the linked network and linked sequential-spatial cognitive maps (23 - or 70%) in comparison to the rest.

Not only is the frequency of network maps is higher (54 %) than that of other types of the maps, but also the frequency of streets mentioned on the maps (65%) is higher than the number of objects (23%) or areas (8%). The same bias towards streets is evident in section 7.4.1 Of this chapter. This is evidence that people structure the image of their city from the structural performance of the streets within the city structure rather than the buildings. These corridors of movement in the city help them to orientate themselves within the city structure, and these places were said to be important because they connect different parts of the city and different important places. The maidans within the street network also have a strong place in their minds as focal points and 90% of the cognitive maps have this sign on it.

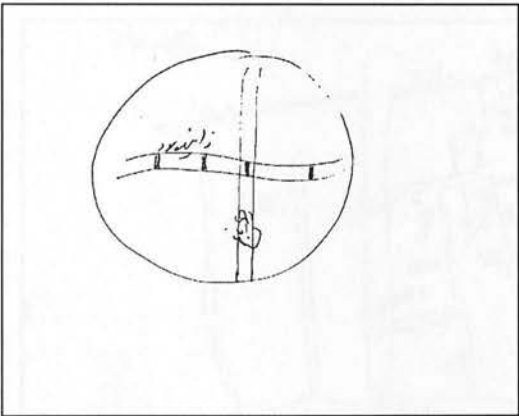
The old structure of the city was not recognised by 13 persons of the 32 respondents, who showed a new gridiron network covering it. Only 6 persons fully recognised that the major parts of the old structure consisted of bazaar, Maidan-e-Kohne, Nagsh-e-Jahan and Chahar Bagh, while 14 persons indicated this only to a certain extent.

The second approach for interpreting of the cognitive maps is based on the variety of the surface structural elements on the map. This approach is an effort to see which elements of the city structure have great structural prominence in people's minds. Map 7-8 is a summary of all the cognitive maps and shows the most frequent places which were drawn or mentioned by name on the cognitive maps. From 55 different places included on the maps, the highest frequency of the buildings and landmarks belong to Thirty-three Arches Bridge, Nagsh-e-Jahan and Khaju Bridge. Chahar Bagh is the axis, most often drawn on the maps. Enqelab Square, Shiraz Gate and Dolat Gate - now city squares - are the most mentioned places on the cognitive maps. All these three squares

are located on the main urban axis of Chahar Bagh, so they are important both for circulation in the city and for the land-uses surrounded them.

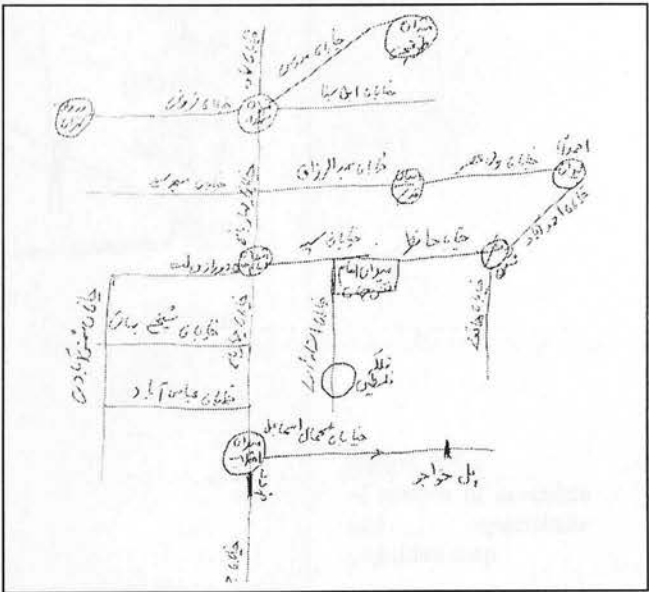
The correlation of the objects mentioned on the maps and the reasons of their importance regarding the most frequent reasons in the rest of the questionnaires reveals the influences of the underlying forces on the cognitive maps. The streets on the maps are the busiest commuting roads within the city, with the most important land-uses in their adjacent buildings. These two important reasons are rooted in accessibility, which is important here for economic and social underlying forces, and in civic services. For the most mentioned objects, land-use, historical and architectural value and thus urban identity, were the hidden dimensions of their cognitive value. Intensive use of the places on the maps is a considerable point, which gives them a high value and resonance the daily life of the people.

The cognitive maps offer valuable evidence of a significant point that should not be neglected. The most memorable places in the collective concept of the respondents are the urban structural objects, which could be maintained by the city structure through long course of the structural transformation of the city.



**Figure 7-2-c**  
Cognitive map showing how people focused on the city main structure

**Figure 7-1-c:**  
Cognitive map showing the whole Isfahan city structure



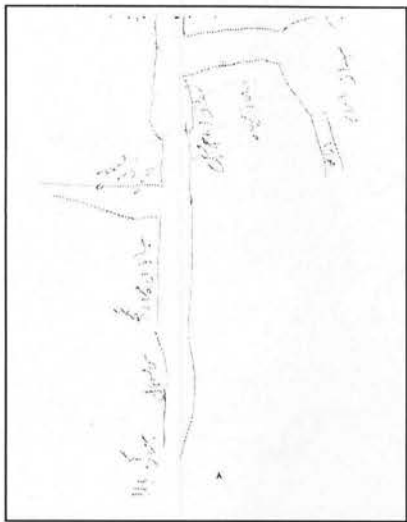


Figure 7-3-c  
A sample of *basic* cognitive map

Figure 7-4 -c  
A sample of *sufficient* cognitive maps of Isfahan

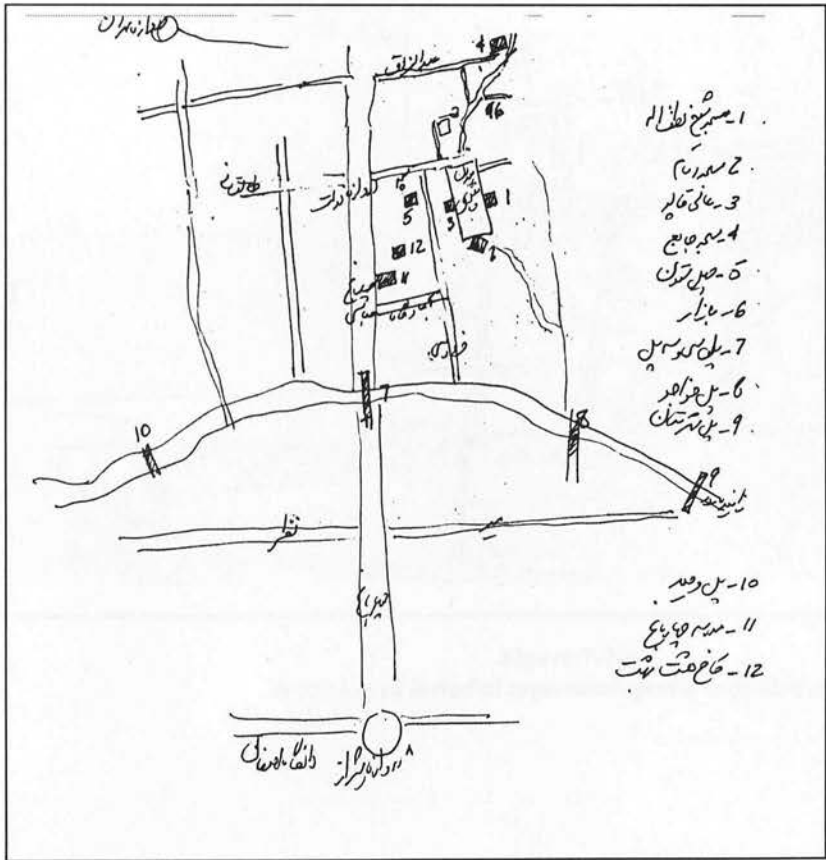
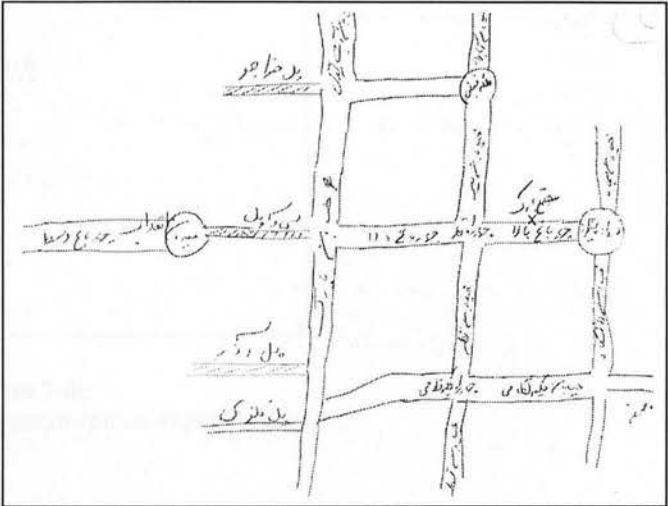
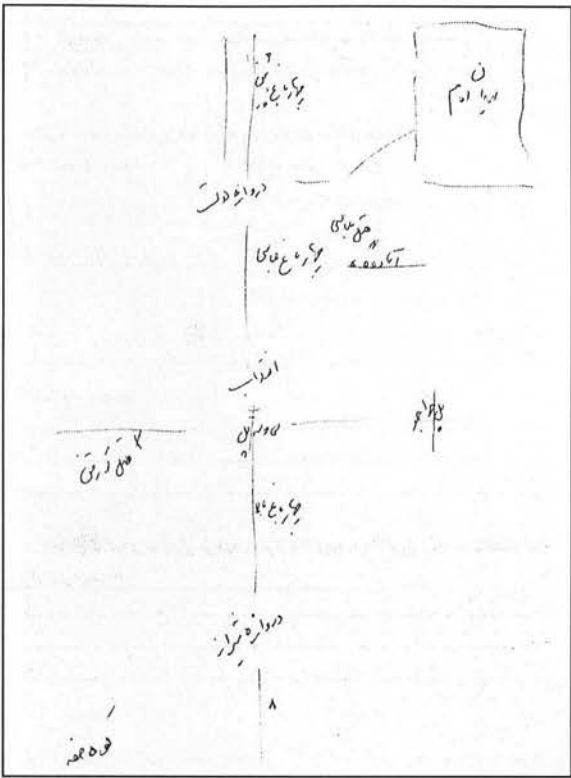
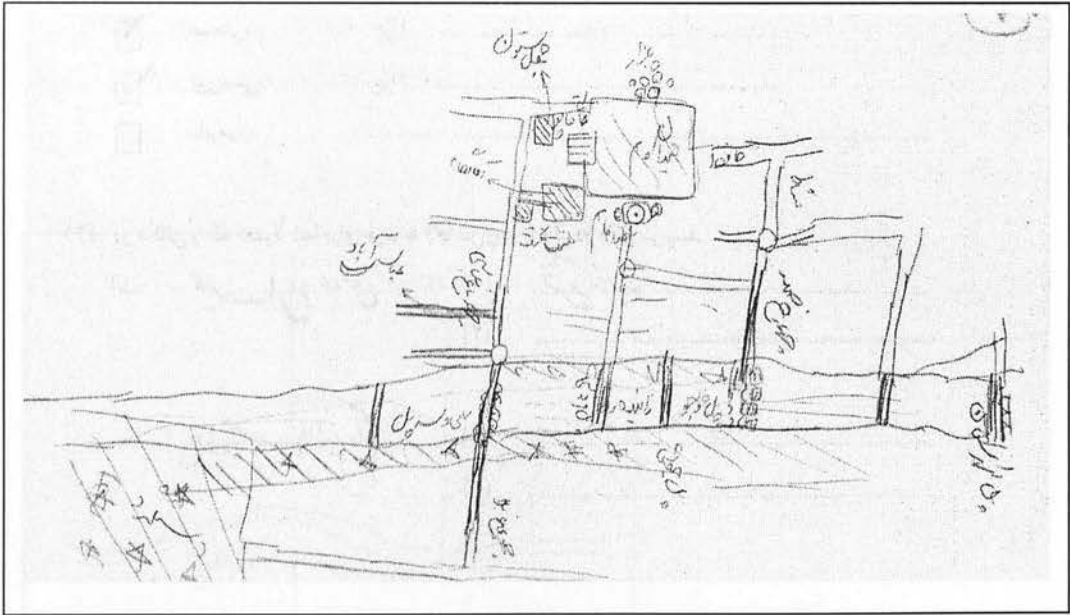


Figure 7-5-c  
A sample of *complete* and *sophisticate* cognitive map

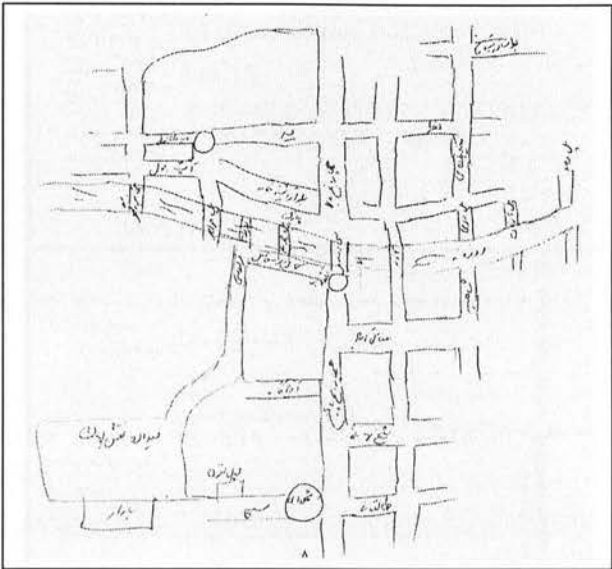


**Figure 7-6c**  
A mosaic version of sequential-spatial cognitive map



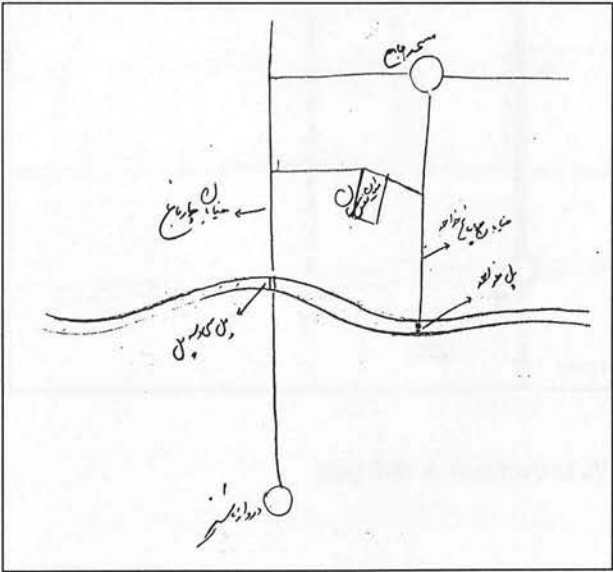
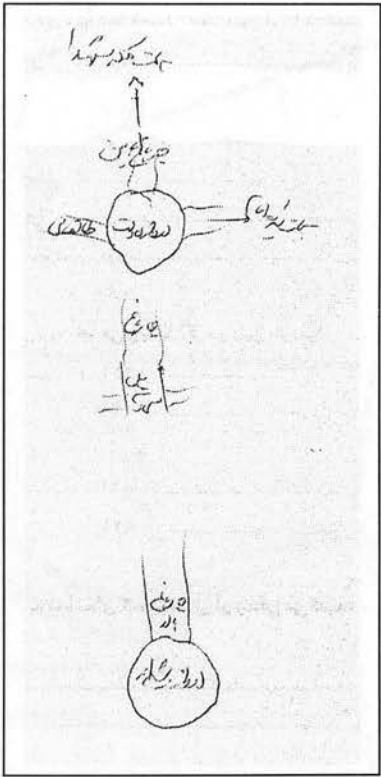
**Figure 7-7-c**  
A version of linked of sequential-spatial cognitive maps



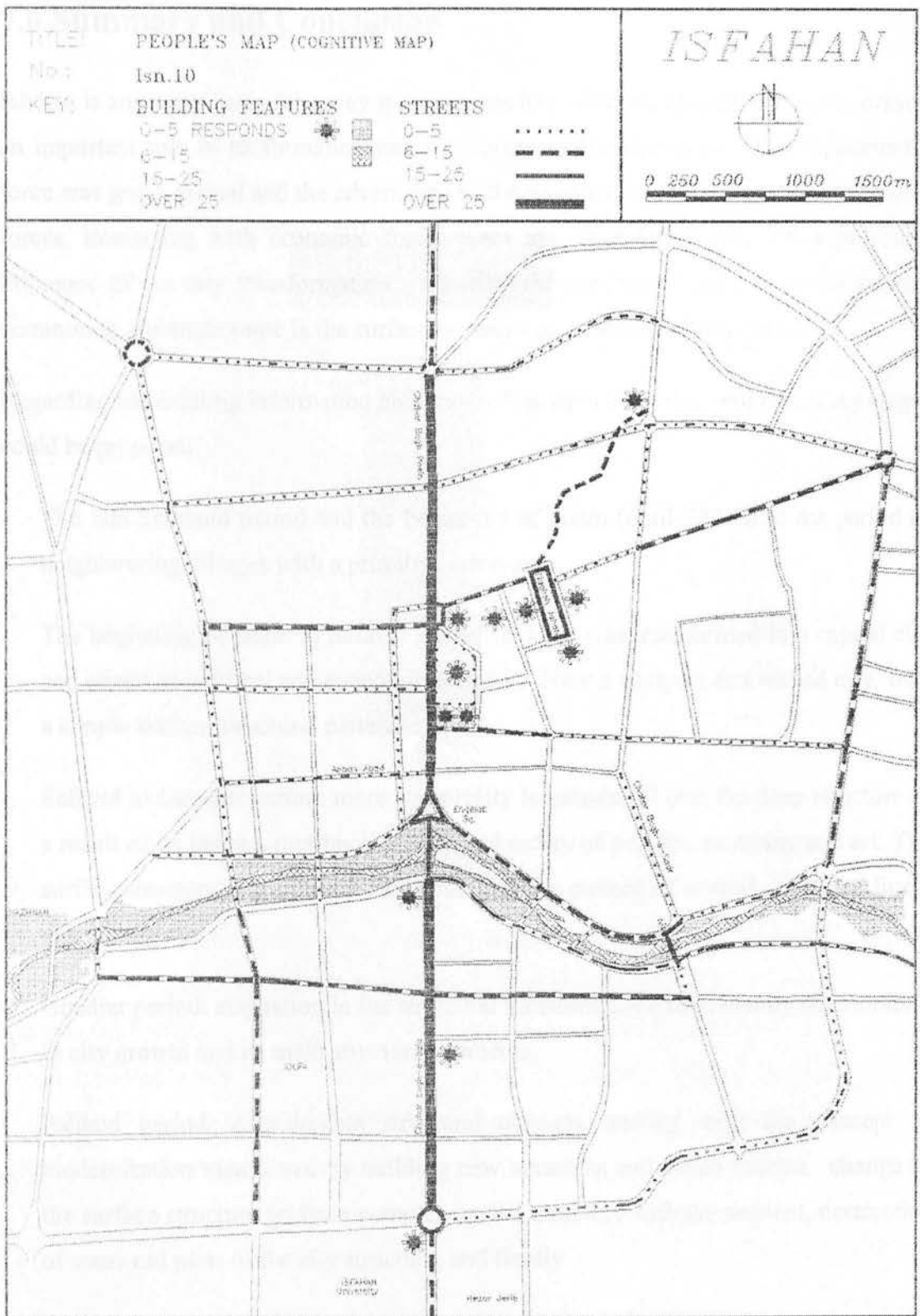


**Figure 7-8- c**  
*Network types of cognitive maps, sufficient and linked*

**Figure 7-9c**  
*Network types of cognitive maps, basic and mosaic*



**Figure 7-10- c**  
*Simple and diagrammatic linked type of cognitive map*



**Map 7-8:** A summary of all the cognitive maps

## 7.6 Summary and Conclusion

Isfahan is an expression of the way Iranian cities have formed. Underlying forces played an important role in its formation and its process of transformation. The fundamental force was geographical and the advantages of the river and its role in agriculture. Spatial forces, interacting with economic forces were the other forces that left a profound influence of the city transformation. Locating the nucleus of the city in the busiest commuting and trade route is the surface response to these underlying forces.

Regarding the existing information about transformation in Isfahan the following stages could be proposed:

- The late Sassanid period and the beginning of Islam (until 722 AD): the period of neighbouring villages with a primitive structure;
- The beginning of Islam to Safavid period: Isfahan was transformed to a capital city and centre of political and economic activities. Now a compact and walled city, with a simple surface structural pattern;
- Safavid to Ghadjar period: more complexity is introduced into the deep structure as a result of its being a metropolitan city and centre of politics, economy and art. The surface structure is transformed to a combination pattern of several nodal and linear elements;
- Ghadjar period: stagnation in the structural transformation followed by deterioration in city growth and its main structural elements;
- Pahlavi period: considerable structural changes starting with the concept of modernisation manifested by building new networks and urban avenue, change of the surface structure gridiron complex spatial structure with consequent, destruction of some old parts of the city structure; and finally
- Continuation of deep structural changes in recent decades of industrialisation period, visible manifestation of more expansion in the gridiron pattern of the main structure, new tendencies to revitalise surviving parts of the old structure of the city.

In the first step of structural transformation a little walled town (Jay), a governmental centre with a citadel and shelter for passing caravans, carried the gene of transformation in a market in front of its gate. The next phase the central nucleus transformed it in three stages:

1. Forming in the margin of town next to the north gate and the main route to the city;
2. Expanding the market place and its transformation to a bazaar between the growing towns of Jay and Yahudieh;
3. Emerging new structural elements – the Friday Mosque and Maidan-e-Kohne – following new laws of composition.

Regarding deep structural elements of underlying forces, in the process of transformation, geography and central location of Isfahan in Iran impacted on the allocation of the city as the capital of two powerful dynasties, Seljuk and Safavid. This introduced a underlying political force that became a strong reason for the flourishing periods of the city life. Structural transformation in these periods were self-regulated responses to the new political and economic situation. The structural laws of composition of the city structure and its hierarchy were manifested in a nodal point (the maidan) in each of these two periods. The nodal points were manifestation of transformed deep structure and were similar in spatial order and function and even the major urban elements. The strong centrality of the nodal points - maidan - was accompanied with structural property of hierarchy based on its structural elements that could organise vital urban elements and functions around. Global surface structure pattern in Isfahan is based on a hierarchical organisation, which its highest level is these nodal points with bazaar as the spine.

The deep structural importance of the maidan rooted in its consisting of major groups of elements:

- The elements related to the Shah (political forces – governmental buildings);
- The elements related to the commercial life of the city (economic forces - bazaar);

- The Jamie Mosque, or the religious centre and the symbol of the urban society (cultural and social forces).

The structural laws of composition came to be demonstrated in a central spatial pattern, the agglomeration of political, social, economic and religion functions with public citywide land-use and destination of centripetal main axes of the most commuted roads. Palaces and governmental buildings, mosques, schools, bazaar and its caravansaries, guest and coffee houses, hospitals, main bridges and avenues are amongst these elements.

As a key step in structural transformation, homeostasis manifested in new demands of a growing city for structural changes. The old maidan was not able to respond to new political, economic and cultural activity demands so a new city centre (Nagsh-e-Jahan) was built based on existing laws of composition urban elements.

The structural laws of composition connected the different major parts of the city, the old maidan to the new maidan, new districts and urban axes - Chahar Bagh and the bridges - and consequently the structural property of wholeness made the city transformation possible. It kept all the old and new parts active and alive functionally and economically.

The centrality of the maidans as focal points within the city main structure was an outcome of underlying forces of political, economic, cultural, social, religious, and entertainment functions working together in a holistic way. Bi-polar spatial composition in structural transformation of Isfahan symbolised two sources of energy in the process of transformation: one manifesting the governmental power (Nagsh-e-Jahan) and the other the symbol of the citizen's power (Maidan-e-Kohneh). These survived side by side for decades because they were structurally equivalent. This concept could even be proposed for in bazaar, where the old pattern with public use for all social classes and Chahar Bagh meet the new urban pattern for royalty.

The simple linear continuous pattern and integrated characteristics of the main axis of Chahar Bagh over different periods of its life has tended to transform planned development into organic city growth and the axis became the powerful steady spine for the city. Even today the two major axis of the city main structure, Chahar Bagh Boulevard as a man-made and Zayandeh-Rood River as natural axis self-maintain



themselves in the city structure. Both of these axes have adapted to high vehicular and pedestrian traffic as well as new and modern land uses and urban activities.

In Isfahan for centuries, the global structure connected the central functions to the residential areas through main thoroughfares branching off the main axes and running towards local centres. This pattern surface structure is a manifestation of deep structural attributes of the city that the primary functions, as the major source of energy for transformation are concentrated in the central area with physical, functional and conceptual centrality in urban life and people's minds.

Stability in Isfahan's main structure transformation has been supported by its structural properties. The existence of strong structural elements like the bazaar as backbone of the city manifests their powerful role in deep structure. This structural element remained the centre of economic activities, although Chahar Bagh has absorbed some of new urban functions and through this self-maintained the structural integration of the city. The same transformation happened in structural element of maidans, the nodal points with major urban activities.

The axuality of the bazaar within the city gives particular identity to it and to its focal point of the maidan. They equivalently integrated social and economic interactions. This structural consistency is also owed to the way they have woven and composed main urban elements like Jamie Mosque to governmental territory and to the commercial activities and thus preserved this centrality.

The recent urban revolution under the name of modernisation has changed its economic basis, bringing in new industry and technology, and created the new social class of the bourgeoisie. Changes in urban functions have qualitatively and quantitatively attracted attention to constructing new street networks, although Chahar Bagh has proved strong enough to stay the city's main axis. Industrialisation has created an imbalance in the cultural and social forces, demonstrated profoundly in physical changes of the city structure.

Isfahan now combines a historical main structure and cultural values of old city spine and the modern development. The bazaar and Chahar Bagh are formed and transformed but stayed alive for hundreds of years despite some inadequacies. Its integrated whole is

composed of six main divisions which connects different stages of its evolution in a simple general linear pattern.

Nagsh-e-Jahan, now as always, is the real focal point of the city and Chahar Bagh the spine or lifeline of the city. The bazaar is now of secondary importance. The main reason for this change is the revolution in underlying forces and the deep structure, and consequently style of life, under modernism. Chahar Bagh Boulevard could respond to the new demands of transforming society because it has spatial potential but the bazaar's efficiency was limited although it is still very important in the economic and social life of the city.

In Isfahan, modernisation has not created a new urban global structure in adaptation with the old main structure. Changes in the underlying economic-cultural and social forces, have been profound and resulted on the surface structure destroying the old main structure in some parts, and imposing a shallow urban grid. The result is poor global integration in the city because urban main elements are scattered in a vast area and the modern streets have not attempted to achieve significant continuity or connectivity between old and new parts of the city main structures. The surface structure of Isfahan is now comprised of four main quarters, which are divided into by the two main axes of the river and Chahar Bagh. It has two very distinctive parts: the congested old fabric in the centre, surrounded by new growing districts. As a conclusion, the whole surface structure of Isfahan has developed from a simple combined pattern of nodal and linear elements to a street network pattern (gridiron) of linear centres that covers the old nodal centres and encompasses the historical urban structure.

The city structure is, in its current process of transformation, struggling to retain its integrated structural values. Although Isfahan has faced many changes in the underlying forces, not all of them are indigenous to the deep structure of the city. As a consequence, Isfahan's surface structure has changed from traditional structure to completely unrelated modern patterns. As a result of this transition, the role and position of the old city structure in the new urban life has faded and lost its coherent relation between deep and surface and old and new. This has brought a great desire for the rehabilitation for the historical centrality of the city centre as a challenge to the great demands of modernisation.

## Chapter Eight

# Analytical comparative Conclusion

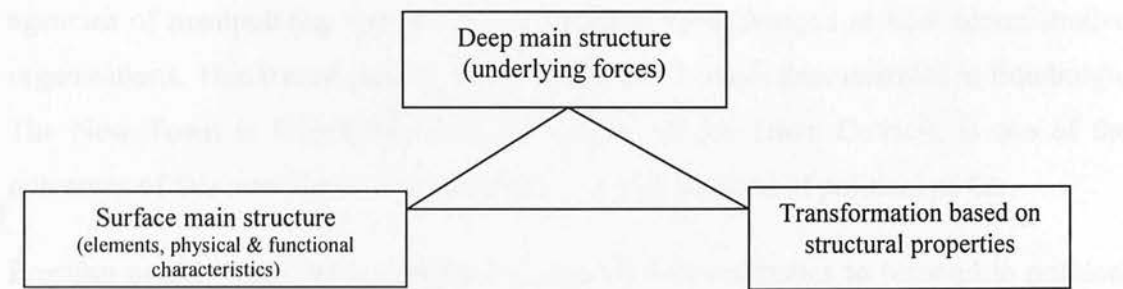


# Chapter Eight

## Analytical Comparative Conclusion

The author believes that a comparative conclusion, supported by inputs from more than one case study, helps to reach a more reliable conclusion. This step enables the researcher to propose some ideas, which make more general the conclusion. The comparison is adapted to derive and classify the similarities and differences between various aspects of the cases of Isfahan and Edinburgh and to use these to reflect upon the hypothesis to support or to refine it. The first part of the comparison is based on the general data about the city main structures' characteristics, its transformation and the second part refers back to the questionnaire survey results.

In the comparison conclusion, emphasise is based on a triangular interrelationship between the deep main structure (underlying forces), the surface main structure (physical and functional characteristics), and also the transformation based on structural properties.



The results could be identified in the way the structural properties affect the underlying forces and how they played role in transformation of the city structure. The manifestation is visible in the nature of the surface structure of the city, in its elements and the patterns by which they are composed.

The mechanisms of transformation in Edinburgh and Isfahan are based on deep structure and underlying forces. Evaluation of the influence of each force for the case

studies reveals that the economic and political forces had the strongest effects on the transformation process of the city main structures. The mechanism of influence of these forces, however is different. Political forces mostly cause planned changes, but economic forces could cause planned or organic changes. Edinburgh Castle and Sassanid Citadel in Jay were the first signs of political forces in structural transformation. These surface elements responded to the necessity of defence and were considerable factors in the nucleus of these cities.

Political forces were also indirectly responsible for developing the settlement by providing peace and security and so opportunities for trade and economy flourished (an interaction of political and economic forces). Not only economic situation but other aspects of urban life, like its social and cultural situations, were conditioned by the political power, so it has always been like a bedrock from which other forces can be activated and transformed. The centuries, in which Edinburgh was the seat of government, it also became the centre of law, education, art, wealth, and social-economic activities. The same can so said for Isfahan, particularly the development in art and crafts, architecture, and other cultural aspects of the urban life.

The distribution of power among the citizenry of both cities, however, has since transformed itself from feudalism to a new style of democratic governance. So the agencies of manipulating the government wishes have changed to new administrative organisations. This transformation in deep structure is more demonstrated in Edinburgh. The New Town in Edinburgh, built by support of the Town Council, is one of the outcomes of this new form of governmental institutionalised of political power.

Erecting public places with outstanding physical characteristics to respond to political desires is another form of political influence on transformation. In Isfahan in different periods, each dynasty constructed its own centre of power in the city. The most influential such enterprise in the transformation of the city main structure happened in the Seljuk and Safavid periods end with construction of a city centre in the form of a maidan surrounded by different land uses. Both of these maidans were focal points of political gravity and symbols of power of the emperor. In Edinburgh, establishing the supreme civic court and then Parliament Place left a noteworthy impact on the formation the main focal point of power in a different mechanism.



Evidence from the case studied shows an important consequence of the underlying forces. This planned growth - supported by the political power - interacts with other underlying forces of the city deep structure in a holistic way, it leaves a profound impact on the future organic growth and transformation of the city. What could be a governmental complex as a closed system because a structural element with structural performance in the process of transformation. They become strong poles in attracting the growth direction for long a time, with surface manifestation as well as deep influence on urban life. In Edinburgh, the New Town is one example; in Isfahan, it is the Chahar Bagh Boulevard that works as a strong axis of growth even today, conducting the city growth and transformation.

Many physical characteristics of the urban structural elements such as location, size, pattern and form followed the political decisions, and economic force it generated. Constructing huge complexes, monumental features, squares and crescents could directly affect the growth of the central part of cities physically and functionally, or do so indirectly by 'setting in stone' a series of regulations that inspired influence further city transformation. The initial mechanism of political forces has massive influence in the short term but the longer term impact of this mechanism is gradual on the process of structural transformation, its physical manifestation and functional development.

Economic forces have an important position in the deep structure of both case studies. As a general result economic prosperity has supported social and cultural activities. The direct consequence was on the surface structure of the city, was the expansion of the public sites and buildings or the erection of outstanding urban elements. The study shows that flourishing economy causes prosperity in urban activities. In the twilight of the economic situation, social and particularly cultural activities declined, demonstrating the negative influence of economic forces in periods of recession. It happened in Isfahan that historical sites and buildings were neglected and so were occupied by or demolished for new uses.

The first nucleus of both cities was located on national and international trading routes. This particular location, although important from the viewpoint of spatial forces, it is as much, if not more so, a consequence of economic forces. The concentration of trade planted a seed of transformation in nodal points (the market place by a gate) or along a linear form (bazaar) in Isfahan. A gradual organic growth emerged from these trading

centres, which later transformed to greater complexity by adding various kinds of urban land uses and activities.

The economic potential of the city main structure is like a genetic characteristic, which could be carried over generations of the urban life of a city like Edinburgh Old Town area or Isfahan Bazaar. It should be regarded as generator of structural transformation, because it has great power in structuring the growth of a city, keeping the city main structure attractive enough to bring more business to the area and therefore requiring the support of political forces, policy making and decision-making or planning organisations. Economic forces are more intrinsic in comparison to the political forces. While political forces can impose dramatic changes in surface main structure, the influence of economic forces is gradual but continuous.

Economic forces provide a chain of activities and events that support each other to survive. In Edinburgh tourism and the festival support leisure activities and vice versa. Although Isfahan has no important event like the festival tourism at a smaller scale plays a similar role in economy of the city.

Considerable economic activity in the central area comes from infrastructure and facilities that have already been provided in the area a form of latent energy reserved there and ready to feed different aspects of urban life. So the surface manifestation of the energy might change but it still makes use of the same energy that resides in the area and is its resource for transformation. This energy, of which economic force is only one aspect, is also reinforced by the human energy, which lead to vitality within the area. *Invasion and succession* of new activities and land-uses from central to the peripheral districts is another aspect of the economic forces. This phenomenon has been evident in both case studies. In Edinburgh, either in the Old Town, or the New Town the surface domain of the city main structure is crippling towards the surrounding areas.

High land value, rents, and good accessibility and concentrated activities have lead to more physical concentration and more traffic, raising a challenge between economic and spatial forces for which each city reaches its own form of equilibrium. The attractiveness of the central areas, particularly for shopping, was an outcome of its high levels of accessibility and choice, supported by services like transportation and other advantages of many years of investments.

The land use pattern of the case studies main structure proved that the more diverse the area, the more successful and economically stable it becomes. Although there are some differences between these two cases, as in Edinburgh residential land-uses are more common in central areas than in Isfahan.

Social forces of the deep structure in both case studies have resulted in more institutionalised life and with its own set of structural elements. This process as inspired more dynamic patterns of social contact and live centrality in the both city main structures. New activities, particularly cultural events, entertainment and nightlife, have come into fashion and from an important kernel to the social life.

As a symbol of social transformation, the city centre provided more public spaces accessible to all social groups of people and so nurturing social dynamics. From cultural point of view more social interactions provided proper atmosphere for both case studies to be a cultural and art centre.

Religion as an aspect of cultural forces was a key force in the transformation of the city main structure, but had greater power in Isfahan than in Edinburgh. Major religious elements like Friday Mosques in Isfahan and St. Giles' Cathedral were the symbol of urbanity, located in the very heart of the city centre and reinforcing the centrality and attractiveness. Even now Friday Prayers in Isfahan is a socio-religious gathering, which takes place in the domain of the city main centre.

The spatial manifestation of the city main structure is the result of a combination of other forces as well as the topological bedrock. Spatial forces in the studied cities worked under three major categories: surfaces, like historical sites or preserved green areas; Linear forms like the bazaar or the road network; and nodal points and landmarks, like Isfahan's Jamie Mosque.

The geographical location played an important, although very different, role in the surface transformation in both of case cities. Each city deep structure responded to its geographical situation in its own way. Both studied cities show the importance of geographical elements to be woven into the surface structure (Isfahan) or to dictate a particular growth form (Edinburgh). Although the geographical situation used to be more effective, many other kinds of forces made possible by the necessity technological

muscle of each city have since overcome them and weakened their role in structural transformation.

The case studies reveal that consequences of spatial forces in terms of centrality, location, size and accessibility have caused physical pressure on the central parts of the cities, which works as a mechanism, struggling achieve physical growth but confronting physical characteristics that seriously limit any space for expansion. This mechanism is manifested on the surface structure in the following ways:

- Creating a more compacted area by dividing urban lots to smaller size (Edinburgh Old Town, Isfahan Chahar Bagh area), accompanied with functional changes (invasion and succession like George Square in Edinburgh and Maidan-e- Kohneh in Isfahan);
- Expansion by crossing geographical barriers or obstacles (the river in Isfahan, the valleys in Edinburgh) by building bridges (North Bridge and Waverley in Edinburgh, Khaju and Thirty-three Arches Bridge in Isfahan). This effectively attempts to replace the sought-after quantitative, expansionist growth with qualitative, inherent growth, using up any ‘slack’ or other pockets of spatial resources inside the cities;
- Jumping free of enclosed historical sites to be able to expand (Edinburgh New Town, Nagsh-e-Jahan, Isfahan);
- Changing simpler patterns to more complicated patterns (nodal or linear patterns to a combination of gridiron and radial patterns in central parts of the cities).

Regarding the impacts of the structural properties on the process of transformation in these two cases studies, the laws of composition have provided physical continuity by connecting the new parts of surface structure to the old, in elements like the bazaar in Isfahan. This integrates old and new parts of the city as an entity. The result on the deep structure and also on surface structure keeps the old parts active and alive because of the powerful attraction of the two poles (old and new). The manifestation of this structural property in Edinburgh could be traced in the New Town development. Despite the huge impression of this new component to urban life, the old structure was not transformed



drastically. The advantage of the property of wholeness in both cases was a responsive dialogue between the old and the new parts as a key notion.

As a sign of the structural property of self-regulation, the case studies functional and consequently physical changes directly related to global function of the city. As the cities were capital cities, so their governmental or administrative functions took hold, and when the trade and economy were more emphasised, commercial land uses like the bazaar in Isfahan and related services grew. Changes in original functions even maintained physical quality of some buildings.

New form of commercial and official districts and buildings (highly specialised) increased in both the cities. Public land-use in Isfahan shifted from historical areas to the new street network. The polycentric pattern of urban growth in Edinburgh (the outskirt shopping centres offices and modern industry) manifests combination of structure-maintaining and structure-changing forces. The most important concluded from the case studies showed that, as long as physical preservation is accompanied with functional development, structural transformation can be achieved.

The property of centrality is perceivable in the city main structures, which could be likened to powerhouses the urban life. It manifests itself in Isfahan and Edinburgh in very concentrated areas of various kinds of activities that provide high numbers of jobs and are filled with people working and visiting there. These areas are not only the centres of work, but also of social activities and entertainment. The mixture of uses and major institutional activities keeps them alive day and night and there people find most social contacts, either for work or for fun. The Old Town in Edinburgh and Nagsh-e-Jahan Maidan in Isfahan are not only the focal point of commerce, cultural and social activities, but also of formal ceremonies and informal shows. All these roles are inherited from their historical processes of transformation.

The most important physical characteristic of the surface main structure is that this area is comprised of memorable features or remarkable monuments, well-integrated streets and squares, with the highest accessibility from all parts of the city.

Renovation of the historic fabric in Edinburgh encouraged people come back to the central area for residential purposes as well as commercial and entertainment activities. This kind of revitalising activities in Isfahan was not considered enough and



consequently it was only public activities, which have developed in historical parts of the city.

Finding from the questionnaire and cognitive maps supports the comparative conclusion. In the comparison some aspects of importance of the mentioned urban elements are location, physical characteristics, and their spatial arrangement. Almost all of the mentioned places in Edinburgh and Isfahan are located in the central compact part of the city and, particularly in Edinburgh, on the outstanding geographical sites of the city. Most of these points have spectacular physical character and are highly visible from different parts of the city centre. Location in a central part with easy access, up a geographical location upon high ground or close to a river, has influenced the importance of many features. These physical characteristics are the outcome of various forces working together that allocate the urban element a remarkable memorable appearance.

The economic force heavily influenced the functional characteristics of the buildings mentioned and that are open to public, intensively uses by people or accommodate special land-uses. This force is also reflected on the most mentioned streets, which are the busiest commuting routes or those that connect two main parts of the city or some major functions and landmarks.

The Historical force was found to be very strong, shown in the historical values of the buildings most appreciated by the respondents. These core vast areas within both cities, giving them unique character, as large areas like the New Town in Edinburgh or Nagsh-e-Jahan in Isfahan, or as linear elements like the Royal Mill and Princes Street in Edinburgh or Chahar Bagh in Isfahan.

Social forces are reflected in either buildings or areas mentioned. Recreational places like the Grassmarket or the Meadows in Edinburgh and Zayandeh Rood River Linear Park in Isfahan are the foremost examples.

Overall, the most mentioned aspects of importance, common between Isfahan, and Edinburgh which reflect the underlying forces are historic, economic (in terms of tourism and especial land-use), spatial (central location, architecture, visibility, beauty), cultural (identity) and political. Social forces were highly important for people, because in both cases these were reinforced by being supported by economic, recreational and

cultural facilities and activities. These forces altogether influenced on cognitive image of the society from the city and its main structure.

The cognitive maps drawn by people of the two case studies revealed the core assumption of the citizens about their city structure and its main elements. Almost without exception, the people in Isfahan and Edinburgh automatically selected the city main structure area to introduce their city and showed a high level of awareness of the structural properties of centrality and hierarchy. The number of respondents who chose to draw the whole city structure was very few. In total, more than 70% of the cognitive are linked maps of network elements with some emphasis on the dominant visible features within the respective networks. These reveals that, in the cognition of these people, the street network are the spatial organisers of urban elements.

The type of urban elements on the maps significantly shows the existence of the deep structure in the people's minds. However, there was one major discrepancy between the two case studies. Although in Edinburgh the old structure of the city is remembered and drawn by people, in Isfahan the old structure of the city has become hidden from the cognition of people. This may reflect the fact that, Edinburgh is currently undergoing a comprehensive programme revitalisation of the historic centre, actively promoting it as an active, residential centre for arts, entertainment and business, the recent moves in Isfahan have seen people moving from their city centre into the outlying centres. It may also reflect the fact that the political force in Edinburgh was given a huge boost with the re-establishment of the Scottish Parliament in 1999, while Isfahan has lost this role to Tehran.

The significant point taken from the cognitive maps is that the most memorable structural elements were those that have proved able to survive through structural transformation of the city and those have structural performance in terms of carrying the gene of transformation.

## *Chapter Nine*

# Conclusion

## Chapter Nine

### Conclusion

#### 9-0 Introduction

This study was motivated by Edmond Bacon analogy of tree and its leaves. The idea deepened the author's perception of the city as an entity, which emerged from its own evolution. The analogy suggests an insight in which the city has special area with intensive and public land uses and activities and outstanding physical characteristics, which evokes visible history of the city.

She observed that some parts of cities with long lasting life are most responsible for urban evolution. The author calls this part of the city, the *city main structure*. Originally she viewed the *city main structure* as directly analogous to the spine of a human being that the rest of the city were like fillers for this main part. The thesis hypothesis regards a city as a living organism, which has a *structure*.

The role of the city main structure in evolution lead to the idea that it must carry an inherent set of intentions, and that it obeys hidden rules that bring these to the surface and give them the continuity to control the urban evolution. The conceptualisation of city main structure then becomes more abstract and subjective. The city main structure consequently observed as a coherent body of innate rules that is able to guide forces throughout the development of the city. In this process of thought, the research thus set to find out their sources of the area that drive and co-ordinate these roles. Identifying the mechanism through which the forces evolve in urban transformation became the basis of the research.

## 9-1 The aim of the research

The main purpose of this research was to find out the mechanism behind urban transformation process, which is based on the city structure and is understood as a coherent body of rules that underpins urban transformation and leads to the visible characteristics and identity of the city. The aim of the research was to understand how the city main structure obtained the power for controlling the process of evolution in the city and what are the sources of the power. The study regarded the way the spatial structure of a city, its urban land-uses and human activities, could help to envisage the mechanism of innate forces in the process of transformation. This research also tries to clarify how physical or functional changes follow the changes in the underlying forces. The research agenda was to build up the city main structure concept and its properties particularly in the process of urban transformation, and to develop a methodology for further research in regards of urban transformation.

The study intended to find a meta-theory to enable the author to test the hypothesis clarify it more, and introduce a set of criteria that could help the analysis of the urban transformation take place. The research achieved the goal through:

- Part One: *Deductive approach*: applying the theoretical approach of structuralism as a school of thought, and
- Part two: *Inductive or empirical studies*: to support the theoretical discussions, The selected cities - Edinburgh and Isfahan - were used for this purpose, and an open-ended questionnaire and cognitive maps technique was applied.

Structuralism was chosen because it offers a way to bridge abstract notions to the city context, using transformation itself as the phenomenon that connects them. It is used as a tool to trace the invisible laws by observing the surface patterns they have generated.

## 9-2 Overview of the study

The main research was comprised of two parts. Part One, the theoretical approach and literature review, built the concept of the city main structure and its transformation. It



focused on structuralism and attempted to organise the theoretical principles for the further discussions around the structuralist paradigm and the structure properties. The literature review shed light on the relevant areas of the urban knowledge.

Part Two reviewed empirical case studies and questionnaires in a search for the evidence of structural transformation and to elicit the city main structure concept in people's minds in Edinburgh in Scotland and Isfahan in Iran. These cases were considered as actual examples to test urban transformation based on city main structure and structural properties. The discussions therefore were qualitative and explanatory. The focus of this part of the study was the underlying forces as deep structural elements and the mechanism of their interaction.

The arrangement of the discussions thus was moved from an *abstract* to an *actual* domain, the case studies support the abstract concepts. Analysis of the end of Part two drew attention to many similarities and differences among the cases.

### 9-3 Recapitulation of the core findings:

#### *Structuralism:*

According to structuralism, a structure is a system of transformation. The dynamic behaviour of a structure is consequence of embodied elements, with ordered relation that cause the structure operate as a whole. The set of relationships is the source of transformation. Those mutual relations underpin the visible forms of the structural elements.

Structural transformation is a process through which the generic attributes of the structure are preserved while it shifts to a higher level of qualitative order and complexity.

The structural properties manipulate the innate forces and energy of the structure and make the process of transformation happen. The property of self-regulation represents the equilibrium, which that system possesses in its innate ability to control its internal processes. Self-maintenance corresponds to dynamic homeostasis, while the character of the structure achieves its higher level of complexity. Laws of composition are the

basis of internal order, hierarchy and centrality. All these properties act as the set of abstract rules for the structural performance. They are the resources for transformation of the structure implies innate dynamism whilst the whole entity is stable.

Deep structure is the underlying forces and inherent laws that make possible the transformation of the elements. The surface structure is the manifestation formed by deep structures.

#### *City structure and City main structure:*

The concept of the city structure is based on the structuralist properties in terms of transformation, self-regulation and holistic function. The city structure gives the whole city its physical and functional order. The manifestation of laws of composition, order, hierarchy and centrality in the city structure confirms the notion that, at its core, resides a city main structure, as a super-ordinated entity within the city structure.

The centrality of the city main structure determines that it is the source of dynamism and stability. The city main structure is not necessarily the centre of the city physically or geometrically but its centrality arises from high degree of interaction between the underlying forces like cultural and economic forces in an identifiable area. The city main structure is a dynamic and historic phenomenon, which supports the city transformation, prevents the urban system from stagnation.

#### *Deep structure, underlying forces:*

Transformation covers changes in the surface structure, the purpose and resources for which are rooted in the deep structure and consequently underlying forces like political, economic and social forces. All these forces have roots in human needs. The city as a social context seeks to fulfil these needs that create the forces. The surface structural elements like buildings and urban activities are the response to the forces embedded in the city main structure. They can take pattern in a form of a nodal point or a line or a surface. The distribution of spaces and movement along urban networks is the spatial consequence of underlying forces.

The structural transformation results from balance and equilibrium between diverse range of forces and conflict, contradiction and, consequently, competition between the forces causes pressures on the deep and surface structures. Any extrinsic forces that

harm the balanced state of the internal structure of a city stimulate the self-regulation, which tends to return to a new stable state.

To recognise the forces is not enough but to know, first how they are applied, and second, how their application causes different changes. To deduce the mechanism of structural transformation is essential for the underlying forces. Underlying forces work in a holistic way to cause transformation and increase the complexity of the city structure.

### *Surface structure characteristics:*

Underlying forces are the deep structural elements that become manifest on the surface structure in the form of urban elements or activities. The human activities need places to take place and those places are urban structural elements that play role in the social structural transformation of the city.

The surface structure represents a flow of energy in the form of a street network or concentrated in nodal points. The links between the nodal points are the channels of energy demonstrated on the surface structure. The final form of surface structure is a diagram of the integration of the forces, internal and external. The manifestation of the underlying forces on the surface structure of the city main structure displays enhanced characteristics like concentration, differentiation, contrast and intelligibility.

The surface structural element should be a direct respond to a combination of some underlying forces. Surface structural elements are primary elements in a city, capable of accelerating the process of transformation in a city with their visual impact or functional importance.

Two groups of visible characteristics are recognisable for surface structural elements: physical and functional characteristics. The surface structure of the city main structure is the greatest concentration of activities, population, movement, and buildings. The utmost concentration has a magnetic power, enables it to attract more energy from other parts of the city structure. The city main structure elements have city-wide activities with vital role in urban dynamics.

The intangible attributes of the surface main structure are important in the urban life. This group of attributes include identity, sense of place, orientation and intelligibility, as an indirect outcome of the deep structure on the society.

#### *Structural transformation:*

Structural transformation involves not only the deep structure but also the surface structures in a process of passing from a simpler to a more complex structure, which might be demonstrated in the emergence of more sophisticated institutions, activities or physical characteristics.

Structural transformation in a city is relied on indigenous knowledge, technology, cultural values, and tradition. It is the outcome of a sequence of thousands of events. Changes, which are not rooted in the underlying forces, cause deterioration or stagnation in the city structure. For they are not called upon by the deep social structure of the city and, do not manipulate the surface structure after its requirements. Growth is only one aspect of the visible consequences of structural transformation. Transformation in cities contributes to the structural elements as well as the whole city structure.

#### *The empirical works:*

The case studies of Edinburgh and Isfahan sought to apply these structuralist ideas by seeing how they related to actual urban phenomena. The use of more than one case study increased the value of the ideas introduced and its contribution to the real works enabled the author to enrich the results by regarding the similarities and differences. The results identified on the way the structural properties affected the underlying forces and how they played role in transformation of the city structure and visible urban elements. Amongst all the forces that the studies referred to, the economic and political forces centred in the city main structures of both Isfahan and Edinburgh were the foremost stimuli for transformation on the surface structure.

The political forces influenced on developing the settlement either directly by erecting governmental complexes or indirectly by providing peace and security and so providing opportunities for trade and economic prosperity.

The governmental complexes, only became structural elements with structural performance if they were erected by considering the structural properties of the city,

allowing them to become integrated into the process of transformation became strong source of transformation of the city as a whole.

The results showed that direct influence of political forces is short-term but can stimulate a more gradual process of structural transformation, physical manifestation and functional development.

Among the many different kinds of economic activities, trade was the most important and worked as a seed of transformation. It can be considered as generator of structural transformation.

Although economic forces are more intrinsic in comparison to the political forces, and economic potential is able to feed different aspects of urban life, but on the other hand it could disorder the internal equilibrium if it overpowers the influence of other kinds of forces in process of the city transformation.

All structural transformations increase qualitative complexity, and this is mirrored in the increase of the dynamic nature of the societies and the vitality of the centres in the cities. A force that overpowers other forces reduces this complexity, by fragmenting the city into zones, by diminishing the opportunities for social life and thereby blocking any further transformations inspired by indigenous resources.

Case studies revealed that consequences of spatial forces is the most visible influence of some structural properties like laws of composition manifested on centrality, location, size and accessibility. In the case of Edinburgh, in particular, outstanding geographical elements that grant spectacular panoramic views, to the built environment created areas of highest spatial value. Spatial forces are in struggle with other forces particularly economic forces, as the internal energy in the central areas has a desire for growth but the interest of physically confined space, expense and convenience continuity seek to limit such growth.

In the process of transformation the relations of new additions to the old parts of the city structure are very important. In this regard, the laws of composition of the city main structure and its deep structure could provide a blueprint for physical continuity by connecting the new surface structure to the old one. The property of wholeness is adieu integrating old and new parts of the city as an entity if the new addition is an extension



of the city structure, forming a responsive and mature dialogue between the old and the new.

The roles of underlying forces are inherited in the historical process of transformation of the city structure. The best evidence of this claim is the property of centrality, which could be maintained and, in the case studies, even enhanced, in the surface structure. The visible result is a central area, which is very active and populated because of the inherited energy of mixture of land uses and major institutional activities. This energy is given a huge subjective value if the area embeds historical and environmental values and if it is accessible from all parts of the city.

The way people conceptualise their city and its structure is a diagram of both deep structural forces and the surface structure, demonstrating the prominence of the structural elements and the importance of the land uses. The research found that all the respondents were able to refer to the surface main structure, even though this was not asked of them directly. The most important elements that the majority recalled were public places with richness of human activity.

The common knowledge of the society about the city structure and its significant elements confirmed that the surface structural elements obtain their value because of their land use or their significant appearance, which is again a sign of important function. The author proposes that the memorability of such elements exists because they are manifestations of the deep structure of the city. This suggests that the people hold on insight as to how the forces interact in the city life and how the quality of this interaction is supported by structural properties, such as the spatial arrangement of the surface elements as a result of laws of composition. Locations that make use of lively central parts of the city or outstanding geographical sites influence the way people could conceptualise their city structure.

National identity and dignity were often attached to the reason why historical buildings held a high value in people's ideas. Social forces are reflected in either buildings or public places that people go for socialising and spending recreational and leisure time.

The cognitive maps drawn by people of the two case studies were evident that majority of people (more than 70%) could conceptualise their city structure through network elements by drawing linked maps and this guide lines were used to allocate the

landmarks or important land uses. Significant point taken from the cognitive maps, is that the most memorable structural elements were those which could be survived through structural transformation of the city and those have structural performance in terms of carrying the gene of transformation and profound position in the common perception of the city structure.

## 9-4 The core idea

The city main structure is like a seed. The genes of this seed carry all the properties of the city. This seed transforms based on its intrinsic energy. The source of the energy is the interaction of various forces. These forces are either environmental or rooted in different human (social) needs and desires.

Structural transformation is a process, the manifestations of which are visible in time and space. The process of transformation continues as long as the city is able to balance different kinds of intrinsic forces. The properties of the city structure influence the mechanism that these forces interact. The city structure self-regulates these forces and brings them in order, according to its laws of composition in a process that derives its energy from these underlying forces. Structural transformation, bring the outcome of this process does not destroy the intrinsic structure. When and where development in a city does not dry out the vitality of the existing city structure, it could be considered as structural transformation.

In the process of transformation extrinsic forces and energies are absorbed and adapted to by the city main structure. Otherwise the imbalance of the internal forces causes stagnation or disintegration of the structure. Any imposed change that disregards the city main structure properties causes damage to the system by failing to consider the underlying forces that provide the hidden energy to the deep. The homeostasis of the city main structure will seek to the imposed energy and destroy or modify its manifestations on the surface structure. Deterioration, either physical or functional, of some urban elements, which affect their contribution to the next phases of transformation, is the consequence of imbalance in the forces.

Such phenomena as out of centre shopping, industry and office areas as a pattern manifest such an imbalance in internal and external forces that the power of economic forces alone has the ability to put an end to the organic growth of the city. This phenomenon lies in the struggle of structure-maintaining and structure-changing forces.

The energy of the process of transformation conditions the urban life of the city and leads it along a process towards more complexity. This process of transformation makes the internal energy stronger and so the city structure and the process of transformation remain vital. The core of this energy and of all the resources for transformation across the city structure resides in its original nucleus, the city main structure. The magnitude of the energy of the city main structure must be strong enough to hold together different districts of a city.

The process of structuring a city and its life is the benefits from natural energies as well as the energies with human source. The various institutions and visible manifestations that are formed to satisfy the society's will, support the process of transformation if they interact holistically and if they are able to enhance the unity of the city entity, and bring all its surface and deep aspects together fragmentation in structured order.

## **9-5 Expected values and application of the research**

This research is a new approach to study and experience the phenomenon of the city. The research results are expected to open up a new way to envisage urban studies and urban design. The research aims to introduce a method for planners and decision-makers to identify the city operation, opening up new avenues for thinking about urban transformation. The authorities evolved in urban planning could benefit from this study as a tool to conduct urban development by using its implications to assess their plans and projects and recommending that any physical or surface structural changes should follow the deep structural properties of a city.

The greatest benefits of this study lie in the conservation of the quality of cities. Its findings indicate strongly that this could come from identifying and enhancing an understanding of how the underlying forces in a society effect the urban structural transformation. The introduced concept and methodology of looking to cities as dynamic wholes could help planners with a new tool of recognising the realities hidden

in the deep structure of a city. The result sheds new light on the physical setting and its impact on communication within organisations. This might give further insight into how the forces interact and how the quality of this interaction could effect further events in a city. The authority dealing with planning and decision-making then is able to support the structural transformation and to prevent the city structure from stagnation or deterioration.

The value of addressing structural properties like homeostasis is that this sheds light on the consequences of neglecting the mechanism of how the city structure responds to any decisions and changes even if they are temporary. Eventually the city will respond the disruption, regarding the intrinsic need for keeping the status of stability and transformation in a society.

There are also managerial implications. Management can with the support of a combined analysis acquire awareness of the patterns of interaction. The results can support policy-making and regulation-approving concerning the design of physical and social systems in which organisations of planning act and perform.

The results of this thesis can, finally be seen as a contribution to the study of the link between the city structure, both objective and subjective and how these contribute to the city's cognitive image. The author believes that she has put forward a strong case for considering the holistic view on the structural operation of the cities, indicating the factors that have to be dealt with and the techniques that could be used in dealing with them. This effort towards analysing the deep structure of cities could be useful to extend the analysis technique to different kinds of cases. To some extent this research has discussed the issue of meaning of the structural transformation and its importance on urban life, but the research gains must be consolidated and extended. This research does much to expose the possibilities of a new look to the structural transformation.

The thesis establishes that the surface structure is nothing but the observable manifestation of the deep structure, brought to human perception as architectural elements, urban networks or social activities, through the patterns and laws of composition that are inherent within the city structure. In short, what the thesis demonstrates is that, by looking at the phenomenon of the city through the structuralist paradigm, one comes to realise that it is a living entity. It generates its own patterns of

growth, it constantly transforms itself in response to its changing environment, it moves always towards greater complexity and will seek to defeat any imposed force or imbalance in internal forces that stand against these purposes. In other words, it self-regulates and uses the resources inherent within its own system (including the energy supplied by the underlying forces of social needs) in order to carry out this transformation and self-regulation.

The thesis therefore warns that any adjustment done to the surface structure that does not express awareness of the deep structure sets up a conflict between surface and deep structure, meaning whether that the city will stagnate or that the new addition will fail. At the same time, it recommends that any such adjustment that does respond to the deep city structure and uses its inherent resources of the city will become a full and active participant in city life, contributing in a holistic and full way to the social vitality. Such a development will be embraced by the city and may even prove to become the seed of inspiration for further transformation of the city main structure.



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## Appendix

This appendix lists the questions that were asked of the students in the focus group interviews. The questions were designed to explore the students' perceptions of the effectiveness of the intervention and to identify any barriers to its implementation.

If you could think of any other questions that you would like to ask, please feel free to ask them now. The questions were asked in a semi-structured manner, and the students were encouraged to provide as much detail as possible in their responses. The questions were asked in the following order: 1. How do you feel about the intervention? 2. What do you think you have learned from the intervention? 3. How do you think the intervention has helped you? 4. What do you think are the barriers to the implementation of the intervention? 5. What do you think are the benefits of the intervention? 6. What do you think are the challenges of the intervention? 7. What do you think are the future directions of the intervention?

The data from the focus group interviews were analyzed using the following steps: 1. Transcription of the interviews. 2. Identification of themes. 3. Coding of the data. 4. Analysis of the data. 5. Interpretation of the data. 6. Reporting of the findings. 7. Discussion of the findings. 8. Conclusion of the study.

The results of the focus group interviews are presented in the following sections:

1. **Perceptions of the intervention:** The students perceived the intervention as being effective in helping them to understand the importance of the intervention and to identify the barriers to its implementation. They also perceived the intervention as being helpful in identifying the challenges of the intervention and in identifying the future directions of the intervention.
2. **Barriers to the implementation of the intervention:** The students identified several barriers to the implementation of the intervention, including a lack of resources, a lack of time, and a lack of knowledge. They also identified several challenges to the implementation of the intervention, including a lack of motivation, a lack of commitment, and a lack of support.
3. **Benefits of the intervention:** The students identified several benefits of the intervention, including an increase in knowledge, an increase in skills, and an increase in confidence. They also identified several challenges of the intervention, including a lack of motivation, a lack of commitment, and a lack of support.

## Appendix

This Appendix shows the questionnaire that was used in both of the two case study cities to elicit information from people that would shed light on the theoretical notions derived from Part One of the thesis. In each city, more than 80 questionnaires were distributed and people asked to respond to them.

It took about three months in Edinburgh and two months in Isfahan for these questionnaires to be returned. For Edinburgh 33 were questionnaires received but only 30 of them could be regarded in the analysis because the rest did not include cognitive maps. For Isfahan the received number was 38 but only 33 of them included cognitive maps and were considered in the final analysis. Some of the questionnaires were completed by later interviewing the respondents, particularly in Isfahan.

The analysis had three major phases: quantitative, qualitative and cognitive study: The qualitative analysis, used a piling technique on the responses, summarised in tables, diagrams and maps, showing the frequency of the objects mentioned and that of the reasons of their importance.

The results of the quantitative analysis focused on the frequency of the responses in four steps:

1. Piling up the various responses in each question organised in 56 tables for each question, based on the respondent's code, consisted of the mentioned places and the reasons of their importance for each question;
2. Categorising the reasons of importance to: objects, aspects, activities and dimensions, a correlation between each object, according to each question, showed the frequency of the aspects (reasons mentioned by the respondents);
3. Correlation in three groups: between aspects and objects; between activities and objects; and between aspects and activities;

#### 4. Correlation between personal data and: objects, activities, aspects and dimensions.

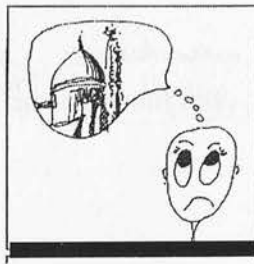
The results of this phase are prepared on more than 200 pages of tables for each city, then the summary of the results are shown in the form of diagrams.

The qualitative analysis has two major steps:

1. Regarding the thesis' concept of underlying forces, the results are analysed and categorised in dimensions. This included all objects, aspects, activities and aspects of importance according to people's perceptions.
2. The next step was preparing several maps for each question out of the responses that show the location of the places that the respondents mentioned.

The most important phase of this part of the research was analysing the cognitive maps drawn by the respondents. This phase had two steps of quantitative and qualitative. The quantitative regarded the frequency of the places either shown on the map or mentioned by name. The next step was to prepare a blank map of each city and show on it all places and objects that had been drawn by the respondents. The following qualitative analysis focused on the structure of the maps and the way the respondents understood and were able to show their city's structure.

The whole process of analysis took more than 6 months for each city because the questionnaire was an open-ended and all the process were done without the assistance of any computer programmes. The results were all together more than 700 pages of different steps of pilling up, categorising and correlating the responses.





## People's Perception and Attitudes to Their City's Main Structure

*The following questionnaire is prepared to support the concept of the city's main structure through the perception and experience of people. This could be helpful to get a better understanding not only by researcher's ideas but also based on people's opinions and judgments. The questions include different aspects of the main structure. It is composed in parts and about 28 questions.*

### PART 1

Responder's Information

Code No: .....

Name ..... (no obligation)

Interviewer: .....

Age..... Sex .....

Date of interview : .....

Occupation.....

Time Start: .....Time finish: .....

Length of stay .....

Place of interview : .....

Address .....

### PART 2

Responder's Perception:

1. Mention 3 important buildings in your city. Please give 2 reasons why they are important

a) ..... 1. ....

2. ....

b) ..... 1. ....

2. ....

c) ..... 1. ....

2. ....

2. Mention 3 important areas in your city. Please give 2 reasons why they are important.

a) ..... 1. ....

2. ....

b) ..... 1. ....

2. ....

c) ..... 1. ....

2. ....

3. Mention 3 important Features in your city. Please give 2 reasons why they are important.

- |          |         |
|----------|---------|
| a) ..... | 1. .... |
|          | 2. .... |
| b) ..... | 1. .... |
|          | 2. .... |
| c) ..... | 1. .... |
|          | 2. .... |

4. Mention 3 important streets in your city. Please give 2 reasons why They are important.

- |          |         |
|----------|---------|
| a) ..... | 1. .... |
|          | 2. .... |
| b) ..... | 1. .... |
|          | 2. .... |
| c) ..... | 1. .... |
|          | 2. .... |

5. Mention 3 most important things pepole do usually in their everyday life and their places which give your city its character. Please give 2 reasons why they are important.

Places:

- |          |         |
|----------|---------|
| a) ..... | 1. .... |
|          | 2. .... |
| b) ..... | 1. .... |
|          | 2. .... |
| c) ..... | 1. .... |
|          | 2. .... |

6. Mention 3 important things that give identity to your city please give reason why they are important.

- |          |
|----------|
| a) ..... |
| b) ..... |
| c) ..... |

7. Mention 2 places in the city which you would advise visitors to visit, please give 2 reasons why.

- |          |         |
|----------|---------|
| a) ..... | 1. .... |
|          | 2. .... |
| b) ..... | 1. .... |
|          | 2. .... |

8a. Mention 3 things or features that you most like in historical part of your city, please give 2 reasons why.

- |          |         |
|----------|---------|
| a) ..... | 1. .... |
|          | 2. .... |
| b) ..... | 1. .... |
|          | 2. .... |
| c) ..... | 1. .... |
|          | 2. .... |

8b. Mention 3 things or features that you most dislike in historical part of your city, please give 2 reasons why.

- |          |         |
|----------|---------|
| a) ..... | 1. .... |
|          | 2. .... |
| b) ..... | 1. .... |
|          | 2. .... |
| c) ..... | 1. .... |
|          | 2. .... |

9a. Mention 3 things or features that you most dislike in moderns building (places) of your city. Please give 2 reasons why.

- |          |         |
|----------|---------|
| a) ..... | 1. .... |
|          | 2. .... |
| b) ..... | 1. .... |
|          | 2. .... |
| c) ..... | 1. .... |
|          | 2. .... |

9b. Mention 3 things or features that you most like in moderns building (places) of your city

Please give 2 reasons why.

a) .....

1. ....

2. ....

b) .....

1. ....

2. ....

c) .....

1. ....

2. ....

10. Mention 2 changes you would like to see in the city in the future, give 2 reasons each.

a) .....

1. ....

2. ....

b) .....

1. ....

2. ....

11. Mention 2 changes which have accrued in your city which you like, give 2 reasons each.

a) .....

1. ....

2. ....

b) .....

1. ....

2. ....

12. Mention 2 ways the new generation can know about past values of life.

1. ....

2. ....

13. Mention 2 important places or features you think are necessary to be protected in your city. Please give 2 reasons why.

a) .....

1. ....

2. ....

b) .....

1. ....

2. ....

which of the main streets are mostly used by you?

- a) ..... reason: .....
- b) ..... reason: .....
- c) ..... reason: .....

Which of the main streets are mostly used by people?

- a) ..... reason: .....
- b) ..... reason: .....
- c) ..... reason: .....

Mention 3 important features or things or events you see from house to work. Please give one reason why they are important.

- a) ..... reason: .....
- b) ..... reason: .....
- c) ..... reason: .....

What are the most beautiful and interesting views in your city? please give one reason why.

- a) ..... reason: .....
- b) ..... reason: .....
- c) ..... reason: .....

Mention 3 places can offer you the most beautiful views in the city.

- a. ....



### PART 3:

19. What are the most 2 important places for the activities (land uses) mentioned below in your city? please mention **1** reason :

a) Governmental (political):

1: .....

2: .....

b) Official:

1: .....

2: .....

c) Commercial:

1: .....

2: .....

d) Cultural:

1: .....

2: .....

e) Religious:

1: .....

2: .....

f) Educational:

1: .....

2: .....

g) monumental:

1: .....

2: .....

h) Entertainment:

1: .....

2: .....

i) Terminals:

1: .....

2: .....

## PART 4:

it would be appreciated if you draw a sketch or simple map of your city. Please indicate important features or Place. The scale is not important. You can use of symbols or notes.



**PART 5:**

This is the abstract map of your city please indicate the location of the places mentioned below  
please use of the numbers for indication.

- 5-1) *Edinburgh Castle*

5-2) *City Chambers*

5-3) *College of Art*

5-4) *Bus Station*

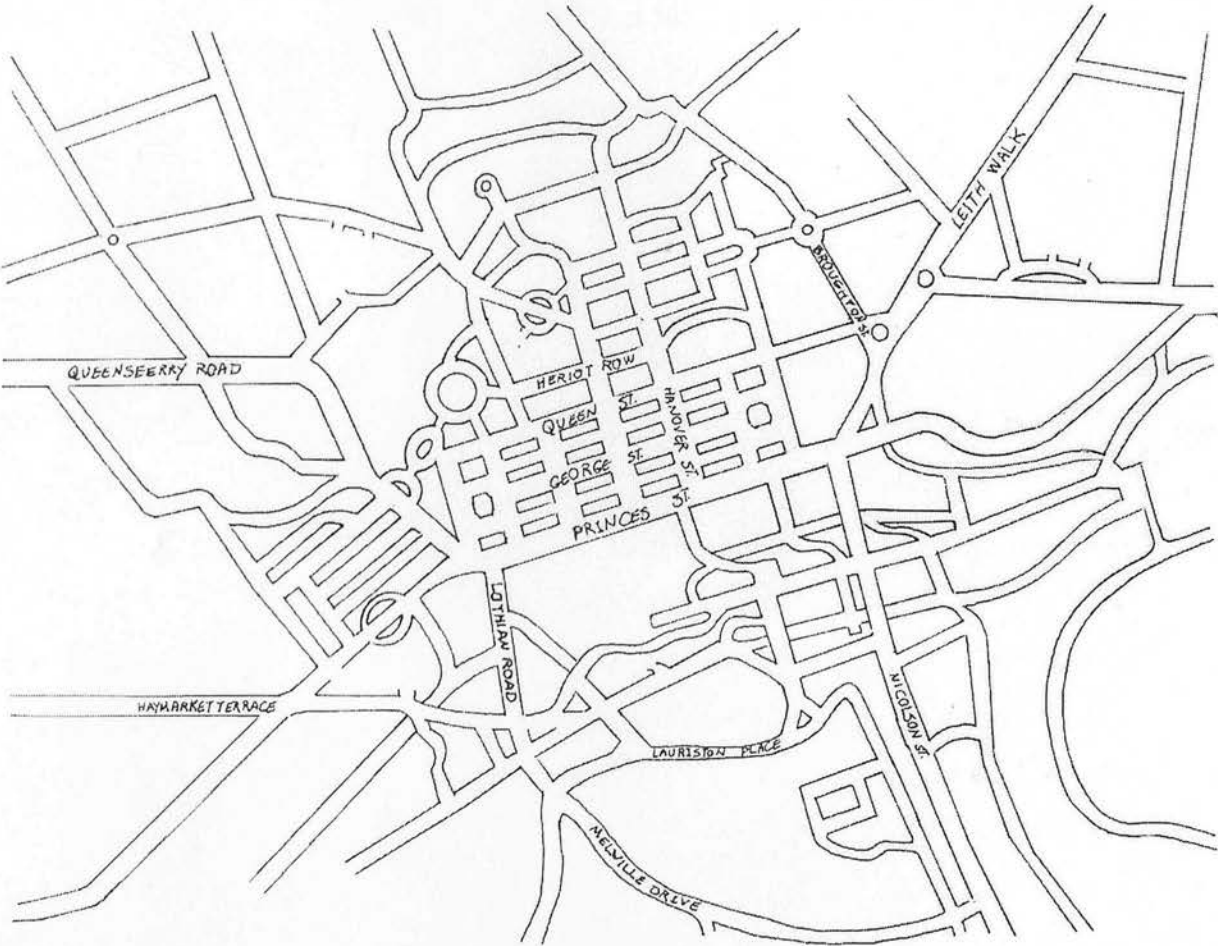
5-5) *National Library*
- 5-6) *Charlotte Square*

5-7) *Grassmarket*

5-8) *National Gallery of Scotland*

5-9) *The Meadows*

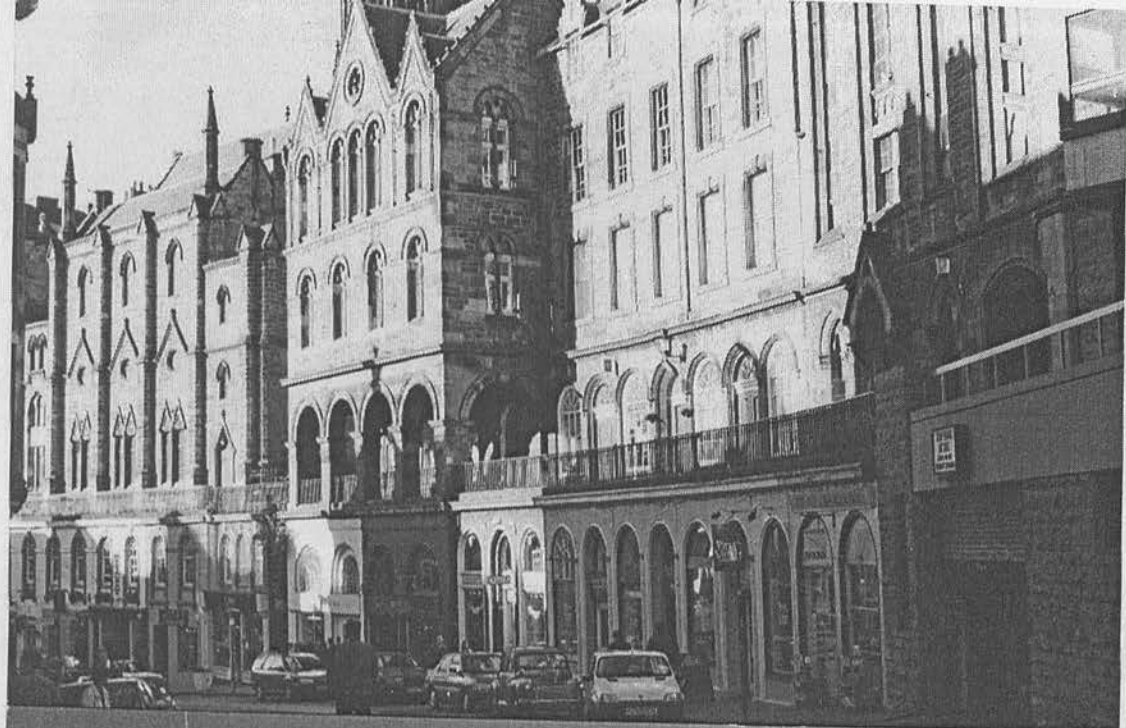
5-10) *Playhouse Theatre*



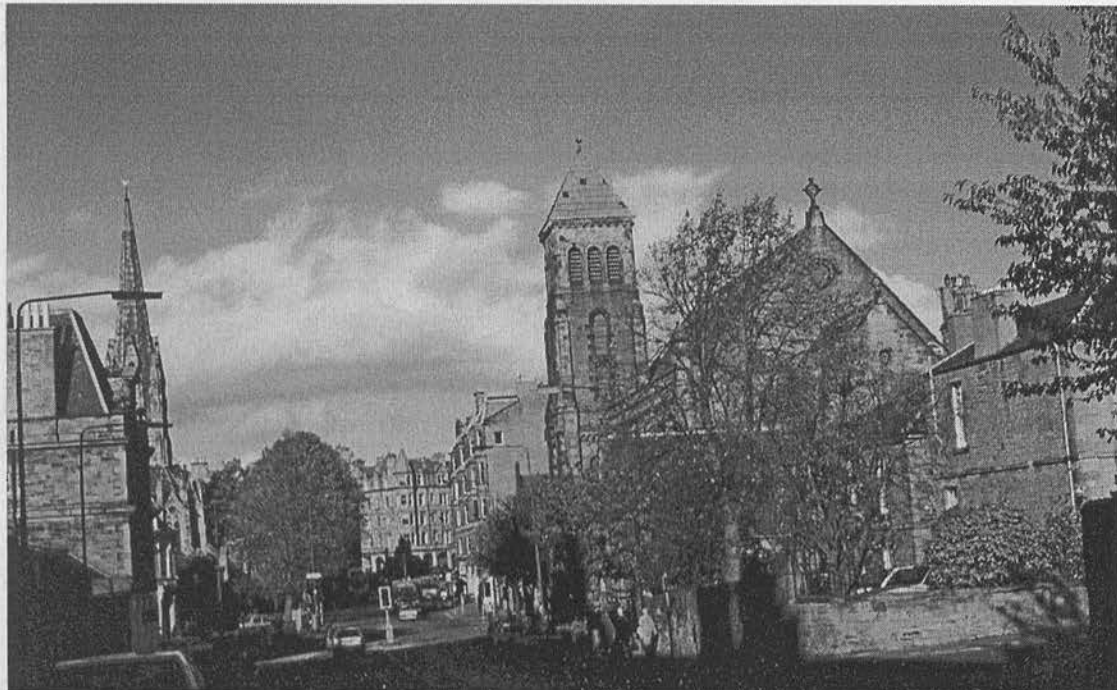
**PART 6:**

Do you recognize where these photographs are if yes, Please write their names :  
numbers.

- |      |       |
|------|-------|
| 6-1) | 6-6)  |
| 6-2) | 6-7)  |
| 6-3) | 6-8)  |
| 6-4) | 6-9)  |
| 6-5) | 6-10) |







4



5



6

